ex libris F. B. Van Coppenole

13305/B

~~MENDES DA~~ COSTA, E. M. da

Red Mary 31457

ELEMENTS
OF
CONCHOLOGY:
OR,
AN INTRODUCTION
TO
The KNOWLEDGE of SHELLS.

By EMANUEL MENDES DA COSTA,
Member of the Academia Cæſar. Imper. Nat. Curioſ. Plinius IV.
And of the BOTANIC SOCIETY of FLORENCE.

WITH SEVEN PLATES,
Containing Figures of every Genus of Shells.

> Concharum genera, in quibus mira ludentis naturæ varietas, tot colorum differentiæ, tot figuræ.
>
> PLINII HIST. NATUR. LIB. IX. CAP. XXXIII.

LONDON,
Printed for BENJAMIN WHITE,
at Horace's Head, in Fleet-Street.

MDCCLXXVI.

WELLCOME
HISTORICAL
MEDICAL
LIBRARY

PREFACE.

AS I never profeſſed myſelf a Conchologiſt, I think it incumbent on me to give ſome account of the cauſe for attempting the elements of the ſtudy.

The bent of my reſearches is the foſſil kingdom. In purſuing that ſcience, the part of it *emphatically* called the *extraneous foſſils*, as ſubſtances not the real productions of the earth, but inconteſtably the *exuviæ* or *remains* of animals and vegetables, I found ſhould be methodized only by the ſyſtems of Zoology and Botany.

The moſt numerous remains of animals found foſſil, are of the Teſtaceous order. They are not only very frequent, but generally near entire or perfect: whereas the foſſil remains of other animals, as alſo vegetables, are moſtly found in detached parts or fragments.

I was therefore induced to dedicate an attention to the ſtudy of this particular branch of Zoology; which produced a work, at firſt formed into a courſe of public lectures on Conchology: but, not meeting with the deſired encouragement, I have now modelled it into the preſent treatiſe.

In regard to the merit of it, in the deviations from other ſyſtems, I entirely ſubmit to the candid judgement of the learned in this branch of natural hiſtory, either to confirm or reject.

One ſubject however I ſhall inſiſt upon; that is, to explode the Linnæan obſcenity in his characters of the Bivalves; not only for their licentiouſneſs, but alſo that they are in no ways the parts expreſſed. Science ſhould be chaſte and delicate. Ribaldry at times has been paſſed for wit; but Linnæus alone paſſes it for terms of ſcience. His merit in this part of natural hiſtory is, in my opinion, much debaſed thereby; and I can compare theſe his terms only to *Spintriæ* *, in a valuable collection of Roman coins.

I therefore with due ſubmiſſion recommend to that otherways great naturaliſt, to change them, and expunge this reproachable obſcenity † from his works.

In the printing off the ſheets, ſome very eſſential errors have inadvertently eſcaped me. Theſe errors, as eſſential ones, and relative to my method, I beg leave to note here, rather than in a common table of *errata*; that they may appear more conſpicuous, or open to the correction of the candid reader: however, I muſt obſerve that they remain only in the text, as the Tabulæ Synopticæ are right.

---

* Very obſcene coins ſtruck by the Emperor Tiberius in his retreat with his favourite Sejanus to the iſland of Caprea; not regarded by Medaliſts, on account of their obſcenity.

† One inſtance will more than ſuffice, and let it be his *Venus Dione*, Syſt. Nat. XII. p. 1128, N° 112; a deſcription, fit only for the peruſal of a profligate Aretin, or Rocheſter.

Page 154, third paragraph, *r.* This ſecond part, which is the fifth family, contains ſix Genera, one Genus whereof, viz. the Orthoceratites, is of a ſimple figure; four Genera, as the Lituitæ or Croziers, Turbines Polythalami, Ammonia and Ammonoïdæ, are all turbinated; and the other Genus, or Nautilus, is revolved.

P. 173, third paragraph, *r.* This third part, which is the ſixth family, contains three Genera; to wit, 1. Nuces ſeu Bullæ, the Pewits eggs or Dippers; 2. Semiporcellanæ; and, 3. Cypreæ ſive Porcellanæ, the Cowries.

The firſt Genus is the Nuces ſeu Bullæ, &c.

P. 174, l. 2, 12, and 14, and p. 175, laſt line, for family and families, *r.* Genus and Genera.

P. 176, l. 1, 7, and 14, for families and family, *r.* Genera and Genus.

P. 177, l. 1, family, *r*. Genus; and l, 6, for eighth family, *r*. third Genus.

P. 178, l. 1, and 4, family, read Genus.

P. 182, l. 2, ninth family, *r*. ſeventh family.

P. 187, l. 1, tenth family, *r*. eighth family.

P. 189, l. 3, eleventh family, *r*. ninth family.

P. 191, l. 10, twelfth family, *r*. tenth family.

P. 193, l. 19, thirteeenth family, *r*. eleventh family.

P. 195, l. 19, fourteenth family, *r*. twelfth family.

P. 197, l. 6, fifteenth family, *r*. thirteenth family.

P. 198, l. 12, ſixteenth family, *r*. fourteenth family.

P. 207, l. 11, ſeventeenth family, *r*. fifteenth family.

All which errors the reader will perceive originate from the primary one, p. 173.

Another very capital error, which is typographical, occurs, p. 128, l. 8, viz. "theſe animals are abſolutely looſe from their ſhells;" whereas it ſhould be, "theſe animals are *not* abſolutely looſe from their ſhells."

P. 135, in the liſt of Univalves, after Aures Marinæ, add Vermiculi and Dentalia; and after Cochleæ, dele Turbines.

I repeat my ſubmiſſion to the candid judgement of the learned; and ſhall conclude my preface with the motto uſed by the celebrated Dr. Liſter, in ſome of his ornamental plates to the firſt edition of his Hiſtoria Conchyliorum:

Joculare tibi videtur;
et ſanè benè:
dum nihil habemus majus,
Calamo ludimus.

EMANUEL MENDES DA COSTA.

London, 4th September, 1776.

CONTENTS.

SECTION I.

OF the Study of Conchology. The definition of Teſtacea and Cruſtacea. Of the Fiſh inhabiting Shells; and whether the Syſtem ſhould be formed from the Fiſh, or from the Shells, &c. Page 1

SECTION II.

An account of the Writers on Shells, p. 24

SECTION III.

Of the Uſes of Shells; and Inſtructions for collecting, cleaning, and preſerving them, &c. - - - - - - p. 58

SECTION IV.

Of the Syſtems or Methods of Shells, p. 79

SECTION V.

The Characters and Parts of Shells defined, and other obſervations, - - p. 101

SECTION VI.

The Author's Syſtem, - - - p. 124

SECTION VII.

Continuation of the Author's Syſtem, and the Claſſification of the Simple Univalves, - - - - - - - p. 135

SECTION VIII.

Claſſification of the Chambered Univalves, p. 154

SECTION IX.

Claſſification of the Revolved Univalves, p. 173

SECTION X.

Claſſification of the Turbinated or Spiral Univalves, - - - - - - p. 180

SECTION XI.

Of Bivalves, and their characters, and parts, with the Syſtems of Authors, p. 232,

SECTION XII.

Claſſification of Bivalves, - - p. 244

SECTION XIII.

Claſſification of the Bivalves that never ſhut cloſe, or the *Conchæ Hiantes*, p. 274

SECTION XIV.

Of Multivalves and their arrangement, p. 278

Explanations of Plates, - - - p. 281

Tabulæ Synopticæ Teſtaceorum; or, ſchemes of Shells, p. 297 & 298

Index, - - - - 299

CONCHOLOGY.

SECTION I.

THE ſtudy of Shells, or teſtaceous animals, is a branch of Natural Hiſtory, though not greatly uſeful in human œconomy, yet perhaps, by the infinite beauties of the ſubjects it treats of, is adapted to recreate the ſenſes, and inſenſibly to lead the amazed admirer into the contemplation of the glory of the Divinity, in their creation.

Shells ſeem to form a part of the Creation, not ſo immediate to the uſe of mankind; they rather appear to be a link of that wiſe and provident chain of nature, by which each part is connected with the whole, and the ſeeming voids or breaks between the ranks of animals is with infinite wiſdom filled up.

This peculiar branch of the Hiſtory of Nature, I ſhall call Conchology [a]. It comprehends the ſtudy of all animals that are teſtaceous, or have ſhell coverings; not only thoſe of the Sea, but alſo thoſe of the Rivers and Land.

The definition of a Shell I make as follows. A kind of ſtone-like calcareous covering or habitation, in which the whole animal, otherwiſe quite naked or fleſhy, (for each part or limb is not particularly covered with this ſtoney cruſt,) lives included as in a houſe: whereas the cruſtaceous animals, as lobſters, crabs, &c. (whoſe cruſt can bear no other definition than this given for Shells,) are not naked, but have every particular limb or part ſeparately covered with the cruſt, which conſequently is formed into many joints, inſomuch that the whole animal ſeems as it were loricated, or in a coat of mail[b].

---

[a] Many authors call it *Conchyliology*.

All Teſtaceous animals are formed of two diſtinct parts: the one, which is the animal, is ſoft or fleſhy; the other, which is the Shell or habitation, is hard, of a ſtoney conſiſtence, and covers the animal; to which it is connected or attached by muſcles.

All Shell animals are exanguious, that is, have no blood ſimilar to that of quadrupeds,

---

[b] Some Authors have ſtrove to give definitions of a Teſtaceous and a Cruſtaceous animal, but in vain, or without any fixed or ſolid characters. See Klein, Nat. Diſp. Echinodermatum, Sect. 1. Shells and cruſts of fiſh have the ſame nature and qualities, and therefore, I think, no other definition can be made.

drupeds, birds, fiſhes, or reptiles; and therefore properly appertain to the fifth claſs of animals, or inſects. They are alſo deſtitute of any bones; thoſe fulcra or props to the muſcles of the animal ſtructure, being exterior in theſe creatures, in their Shells; and not interior, as all bones of other animals are placed. However, they are endowed with the principal parts, as the mouth, lungs, heart, &c. beſides other parts ſuitable to their nature of life. The full deſcriptions of the animals themſelves, or any anatomical diſquiſitions, are not the ſcope of my preſent work. It is rather too abſtruſe and unentertaining: but for thoſe curious particulars I ſhall refer my readers to the principal authors who have inveſtigated them ſcientifically; eſpecially Liſter[c],

---

[c] The Oyſter, common Land Snail, &c. in his Hiſtoria Conchyliorum—Exercitatio Anatomica, in quâ de Cochleis maxime terreſtribus et Limacibus agitur. Lond. 1694, 8vo. Exerc. Anat. altera, in quâ maxime agitur de Buccinis Fluviatilibus et Marinis.

Adanſon in his Hiſtory of the Senegal Shells; and Argenville, in his Zoömorphoſe, added to the ſecond edition of his Conchyliologie.

Beſides the above, we meet with many deſcriptions of Shell fiſh diſperſed in the works of the curious; ſuch as Columna's account of the Purpura[d]; Rumphius, of the animals of the chambered and paper Nautili; Reaumur of Solenes[e] and Pholades; Sellius of the Teredo or Ship-worm[f]; and ſeveral others[g]; and laſtly, the

---

Marinis. Lond. 1695, 8vo. et Exerc. Anat. tertia, Conchyliorum Bivalvium utriuſque Aquæ. Lond. 1692, 4to. all with figures.

[d] Fabii Columnæ Lyncei Purpura, ſeu de Purpura ab animali teſtaceo fuſa, aliiſque rarioribus teſtaceis quibuſdam. Romæ, 1616, cum fig. 4to.

[e] In the Memoirs of the Royal Academy of Sciences at Paris.

[f] Godofredi Sellii Hiſtoria Naturalis Teredinis ſeu Xylophagi Marini. Trajecti ad Rhenum, 1733, 4to. fig.

[g] Joh. Jacobi Harderi M. D. Baſil. &c. Examen Anatomicum Cochleæ terreſtris domiportæ. Baſil. 1679, 12mo, fig.

the juſtly celebrated Linnæus, who places at the head of the definition of each genus of Shell the genus of animal, which, according to his ſyſtem, inhabits them: however, all theſe deſcriptions of the animals have never yet been collected together, and methodically digeſted.

This naturally leads me to the diſcuſſion of a ſubject of great debate among Naturaliſts, which is, whether the methodical ſyſtem or arrangement of teſtaceous Animals ſhould be formed from the Animals themſelves, or from their habitations or Shells. The former method ſeems moſt ſcientifical; but the latter, from the Shells, is univerſally followed, for many reaſons.

Ant. de Heyde M. D. Amſt. Anatome Mytuli. Amſtelod. 1684, 12mo. fig.

Rouſſet, Obſervations ſur les Vers de Mer qui perçent les Vaiſſeaux, &c. La Haye, 1733, 8vo. fig.

Swammerdam, Biblia Naturæ, Leydæ, folio. 2 vols. fig.

The vaſt number of ſpecies hitherto diſcovered, and the numerous collections made, exhibit only the ſhells or habitations, the Animals themſelves being ſcarcely known or deſcribed. Of the ſhells we daily diſcover, few are fiſhed up living; the greater number are found on ſhores, dead and empty. Accurate deſcriptions of Animals, whoſe parts are not eaſily ſeen or obvious, and anatomical reſearches, are not in the capacity of every one to make; nor are the particular parts and their reſpective functions ſo eaſily cognizable to any, but expert, aſſiduous, and philoſophical enquirers. How is it poſſible then to arrange a numerous ſet of Animals by characters or parts, we can with difficulty, if ever, get acquainted with, in the far greater number of the ſpecies we collect or diſcover?

The indefatigable and accurate Fabius Columna was ſurprized at the omiſſion; he even complains of it. It is aſtoniſhing, ſays he, that of all the writers on this ſubject, not one has conſidered the Animals that inhabit the ſhells, or given figures of them. He owns, however, that many are ſeldom ſeen by us, and that the reſearches on their manner of life are extremely difficult. The great difficulty of theſe reſearches ſhould have been his anſwer: and it muſt always remain ſo; for of the great number of ſpecies diſcovered ſince his time, (an æra in which natural hiſtory has flouriſhed more than at any other period) we ſcarcely know the inhabitant Animals of ſome ſcores; and even thoſe are very few of diſtant regions, but chiefly of the coaſts of Europe, countries in which aſſiduous and expert naturaliſts have reſided.

The moſt eaſy and obvious characters are certainly the beſt on which to found all ſyſtems of natural hiſtory. I have treated this point fully in my lectures on foſſils. Scientifical reſearches in regard to the arrangement of Animals are to be held in the ſame light, as chemical ones in regard to foſſils: they are the extreme diſquiſitions to aſcertain the ſpecies, when the more obvious and eaſy characters are vague or wanting.

Thus all ranks of animals are arranged into ſyſtems by obvious and external, not by ſcientifical characters; even the animals of bulk, and that are our conſtant companions. Quadrupeds are methodized by their teeth, horns, hoofs, and hides or coverings; birds, by their plumage, beaks, and claws; reptiles and inſects, by like particulars; the very fiſhes, though of a different element, undergo arrangements by their fins; and the vegetables are diſtinguiſhed by their flowers and fruits. All theſe arrangements are on the principles of external and obvious characters. Why then is it required to arrange by ſcientifical or difficult characters a ſett of animals who chiefly live in the depths of the ſea, have hardly a progreſſive motion, and are for the greater part difficultly, if ever, in our reach? I repeat, why ſhould naturaliſts demand of ſuch animals only, a ſyſtem, or arrangement, the moſt difficult to attain? while all the other orders of animals, whoſe arrangements by ſuch methods are more eaſily attainable, are methodized only, and with univerſal conſent, by the obvious characters, of teeth, plumage, and fins: characters that cannot be held in any other light, than as analogous to the external characters, or the Shells of teſtaceous animals?

I am well aware of the arguments alledged againſt it, *viz.* that, as long as we ſtudy only the very Shells, thoſe empty habitations, thoſe ſpoils or remains only of the animals, the preſent ſole objects of our reſearches and collections, we conſider theſe beings but partially, or with a ſide view. There is more to be required. The animals that inhabit them ſhould certainly guide us in our methodical arrangements; they alone are the principal parts, the very fabricators of the habitations, and give them their forms, bulk, hardneſs, colours, and all the other particulars of elegance, we admire. If we were to examine attentively theſe new or almoſt unknown beings, we ſhall diſcover, in their actions and ways of life, an infinity of admirable curious and intereſting particulars, capable of exciting the attention of the moſt inquiſitive and expert naturaliſts. We ſhall alſo diſcover, in their ſtructure, a number of parts as remarkable for their forms as for their functions: this part of the ſtudy, therefore, ſhould be ſeriouſly contemplated; and not the ſuperficial part, or the Shells only.

Neither is this ſuperficial arrangement, or by the Shells, exempt from many and great difficulties; for Shells, in their different ſtages of growth, are of very different colours and forms. It is therefore indiſpenſably neceſſary to define and know the animal itſelf, to fix the ſpecies. This objection, however, I do not conſider as a ſolid one; ſince the naturaliſt muſt know, that different colours and forms or appearances, in the different ſtages of growth, run equally with teſtaceous animals, through all the orders of nature. Thus for example: the horned quadrupeds have their horns only at ſtated growths; the birds, a ſtated colouring of plumage; ſome inſects, yet more remarkable, crawl one part of their lives on the terreſtial, or cut the watery, before they ſport in the airy, element. Theſe are far greater changes than any we know of teſtaceous animals: and therefore the abſolute neceſſity to ſcrutinize or define the creature by the different ſtages of its growth, can never, I think, be demanded for them, more than for any other order of animals.

I ſhall elucidate this point by the following account: Mr. Adanſon, in his Natural

Hiſtory of Senegal, *p.* 27, an accurate Author, who would methodize teſtaceous animals by the Fiſh and not the Shells, deſcribes the *Libot* or *Black Limpet* found on that coaſt. In his deſcription, he ſays, that ſuch a vaſt variety of differences is to be obſerved in this ſpecies, that it is difficult to meet with two Shells alike; and any perſon would be led to conclude that they were abſolutely diſtinct ſpecies, did not the fiſh, or animal, prove the contrary, by being the ſame in all. The Shells differed in colour and form; ſome were white, others grey, aſhen, or black; very flat, or very raiſed, or copped, the number of furrows unequal, from twenty-five to fifty, and are at times ſet with ſmall prickles. The jaggings or toothings of the contour alſo differed widely; ſome being ſmall, or meerly notches, while others were ſo ſlaſht, or deep, that they gave the whole Shell the form of a ſtar with five or ſeven rays.

After having made my obſervations, continues Mr. Adanſon, on great quantities of this ſpecies, I find that all theſe varieties proceed not only from their different ages, but alſo from the difference of places they are found in: however, in all the Shells, whether young or old, I found a conſtant or fixed character in the eye, or beak, which is always pretty obtuſe, and ſituate at about two thirds of the length of the Shell.

I ſhall obſerve, in anſwer to the above, that the different ages of Shells certainly make them wear different appearances, in colour, ſhape, work, *&c.*; and I am convinced, that ſome are even ſo greatly changed from one age to another, that they appear abſolutely different ſpecies. The want of opportunities to trace the different progreſſions, growth, or changes theſe animals of the deep undergo, is a *deſideratum* which human powers can never attain; and conſequently, we muſt always be open to ſome confuſion and error in this branch of natural knowledge.

Mr. Adanſon obſerves, with great preciſion, that the difference of the Shells of this kind was ſo extremely great, that he ſhould not have heſitated to pronounce them diſtinct ſpecies, had he not found the ſame animal in them all. Indeed a ſcrutiny into the different Shells he quotes to be of this one ſame kind is amazing, for hardly one of them agrees with the others: for, beſides this *Libot* or *Black Limpet*[h], he alſo joins with it the *Thorny Limpet*[i], the *Beauty*[k], and the *Aſtrolepas Limpets*[l], all as of the very ſame ſpecies; which Shells have not the leaſt reſemblance to each other.

---

[h] Patella nigra, Anonymous New Conchology, Pl. 1. fig. 8. p. 5. N° 8.

[i] Patella echinata, Id. Pl. 3. fig. 13. p. 18. N° 13.

[k] Patella pulchra, Id. Pl. 2. fig. 8. p. 12. N° 8.

[l] Aſtrolepas, Id. Pl. 3. fig. 2. p. 14. N° 2.

Obſervations made by reſpectable and learned naturaliſts deſerve particular attention. I therefore allow with Mr. Adanſon, that the ſame ſort of fiſh being found in all the above Shells is a very preſumptive proof of their being of one ſame ſpecies, though I cannot allow it to be a poſitive or deciſive one. I will allow him, that the whole external appearance of the fiſh and the particular parts were nearly the ſame; yet I think even that is not a poſitive proof. For I imagine, the very ſame kind of animal inhabits different covers or Shells. As for example, the Snails may be the ſame kind of fiſh, and form the genus, yet vary ſo much in their habitations or Shells, as to form different ſpecies of that ſame genus, from only the differences of the Shells or coverings: for the Shell, or covering, may be held for as great a character of the ſpecies, as the very fiſh. Thus the Volutes called *Admirals*, *Brocades*, *Purple Tips* or *Onyxes*, *Tigers*, &c.

though ſuch different Shells may be inhabited by the ſame kind of fiſh, to wit, a *Limax* or *Snail.* And therefore, though the *Limax* or *Fiſh* is of the very ſame kind, and forms or fixes the genus, yet the Shells, always conſtant, will fix or define the ſpecies of that ſame genus. An analogy to this bears ſtrong through all the Animal kingdom; for ſpecies of Quadrupeds are diſtinguiſhed and defined in their genera, from the different colours of their hides; Birds by their various plumage; and Inſects by their different colourings. Therefore, why ſhould not Shells, which wear ſuch ſtrong characters, by the ſame parity of reaſon, form ſpecies of the ſame genus? or, in other words, why ſhould not the ſame fiſh, or genus, yield many different ſpecies, according to the ſeveral characteriſtical differences of its Shells or habitations?

I have allowed that Shells in their different growths vary exceedingly, even ſo much in ſome, as to appear different ſpecies. All orders of Animals vary in like manner in their different ſexes, as well as in their different ſtages of life. Thus for example, the Tadpole ſeems a different ſpecies from the Frog; the Caterpillar from the Butterfly; the Flamingo bird when young is quite white, but when of a certain age of a beautiful ſcarlet; the cornigerous quadrupeds that ſhed their horns alſo run through ſeveral ſtages, before their horns are complete. Theſe changes we are acquainted with, becauſe they are always obvious to us, and are wrought on animals that are our companions, and breathe in the ſame element. It is otherwiſe with the animals of the deep, the knowledge of which we acquire only by accident; and it is even impoſſible for us to follow them in their various growths and changes, by the moſt aſſiduous obſervations.

I therefore hold, that the arrangement of Teſtaceous animals ſhould be made only from their Shells, as the moſt obvious and ſtrong characters, and not from the fiſh: for the eſpecial colours and forms of the Shells do not the leſs give a diſtribution or order, and proper characters to go by, than does the mechaniſm of the very fiſh themſelves. However, I do not by this deny all aſſiſtance from the fiſhes to aid the ſyſtem; the knowledge of them will undoubtedly be of help, but then they are meer ſecondary and not primary characters. I do not adhere to this opinion, from the ſole difficulty of human powers ever attaining compleat obſervations on theſe animals of the deep, but alſo for the following reaſons.

Though Shells are of ſuch different appearances in their different growths, I will venture to eſtabliſh an axiom as inconteſtable; by which the accurate and judicious Naturaliſt ſhall always be capable of diſtinguiſhing the ſpecies by the Shells alone, though he has many of the ſame kind, of very different appearances, before him: for every ſpecies has one or more particular ſpecific character, either in work, colour, or ſubſtance, &c. which it retains through all its various ſtages and forms, and therefore is always to be diſtinguiſhed and known by it.

Mr. Adanſon drew a concluſion of the different Shells he propoſes for the ſpecies of the Black Limpet, from the ſituation of its eye or beak being at two thirds of the length of the Shell. This ſituation of the eye, he, for want of accuracy, thought to be a particular character of the Black Limpet: but he overlooked, or did not know, that the eyes or beaks of many other ſpecies of Limpets are placed in like manner, or at two-thirds of the length of the Shell. He therefore erred as much in making that particular the criterion of the Shell, as in making the fiſh only, the criterion of the whole animal, or fiſh and ſhell.

But to produce ſome inſtances of what I advance, the Goat's Eye Limpet[l] wears perhaps as many different appearances as any ſpecies of Shell, and even often greatly reſembles others; but look only on its ridges, the character of which is to be three-edged like a triple-edged ſpear or ſword, and it is immediately recognized through its different appearances.

The Garnet Limpet[m] has in like manner many different appearances; nevertheleſs its elegant garnet-like ſemi-tranſparent eye or top always characteriſes it through all its colours and forms.

---

[l] Anonymous New Conchology, Plate 2. fig. 1.

[m] Id. Carbunculi oculus, Pl. 2. fig. 4. p. 10. N° 4.

The ſmall Blue-rayed Limpet[n] of our coaſts is, when young, thin, horny, and very conical; when old, thick, flattiſh, and miſſhapen; yet its few blue ſtreaks always characteriſe it.

The Bloody-tooth Nerit is known through all appearances, by the blood-like ſpots on its teeth.

Each volute has ſome particular ſtreak, band, ſpot, or colour, which it preſerves through all its ſtages.

Even the Rocks or Murices, the Spiders, and the Winged Shells, whoſe appearances in their ſeveral growths, above all other Shells, are ſo extremely different, that when young they have narrow, ſharp, thin, ſmooth and even lips, and the opening is pretty clear or free; when old, this lip is greatly extended, very thick, pronged or ſet with large ſpikes, and almoſt cloſes their mouth or opening. Yet even all theſe Shells, either in the turban, body, tip, work, or colour, have conſtant and fixed characters, which diſtinguiſh them throughout all theſe extremely different appearances.

---

[n] Id. Patella integra exigua, lævis, cornea, cœruleis lineis inſignita. Plate 4. fig. 4. p. 20. N° 4.

It is needleſs to enumerate other inſtances; they will occur in the ſeveral claſſes, as we proceed. I will therefore cloſe this ſubject with the following reaſoning; *viz.* Granted that the various growths or ſtages of the inhabitant animals change the forms and colours of the Shells ſo very greatly; it evidently enſues, that the animals themſelves muſt undergo as material changes in their forms. It cannot be otherwiſe; for the Shell muſt always anſwer to the animal, and its ways of life; therefore, if great changes happen to the animal as well as to the Shell, we remain in equal uncertainty as to an arrangement by the fiſh, as by the ſhells: but as the Shells have the moſt obvious and eligible characters, and are more eaſily attainable, the methodical arrangement from them is certainly to be preferred.

The *term* of *Conchology*, applied to this branch of Natural Hiſtory by all authors, is quite applicable to its arrangement by the Shells, and not by the fiſh.

SECTION II.

I ſhall now proceed on another general part of the ſubject; that is, to give ſome account of the works, written ſolely or profeſſedly on Shells, in order to enable collectors to make a proper choice of authors.

Buonanni, Ricreazione dell' Occhio, e della Mente, nell' Oſſervazione delle Chiocciole, printed in Italian, in 4to, at Rome, in 1681, is the firſt profeſſed work on the ſubject. It was afterwards tranſlated into Latin by the Author, and was republiſhed with additions, alſo in 4to, and at Rome in 1684, but this Latin edition is rare.

Buonanni's work gives us a ſeries of figures of the ſeveral ſpecies of Shells, to the number of 450 in the Italian edition, and of 550 in the Latin edition; they are moſt of them tolerably well engraved, but faulty in that the Shells are reverſed by the inaccuracy of the engraver. He accompanies each with its particular deſcription; but the deſcriptions are not good, being too conciſe and uninſtructive; he beſides gives ſeveral philoſophical chapters on the origin, nature, forms, colours, properties, and other curious particulars of Teſtaceous animals.

The next is Liſteri Hiſtoria Conchyliorum, publiſhed in folio, at different times, from 1685 to 1692. It is an excellent work, and I do not heſitate to pronounce it the very beſt, though the ſecond on the ſubject, that ever was printed.

This work, which conſiſts entirely of engravings, has the following faults, that render the copies more or leſs perfect. Firſt, no two copies are found to be exactly alike, it is ſubject to ſo many variations. The plates about 1067 (in the moſt perfect copies) are augmented or diminiſhed, miſplaced, or corrected, at different times, according to the fancy or ſubſequent diſcoveries made by the author; it is therefore very difficult to quote the work in ſuch a manner as to be quite anſwerable to other copies. The engravings are very elegant and accurate, and were done by his two daughters, Suſanna and Anne. In regard to deſcriptions there are none, but what the ſynonyms infer, which are generally very good. The native countries of a few are alſo added, but the greater part are mere engravings without any name: and though the many diviſions of the hiſtory into books, parts, ſections, and chapters, ſeem very puzzling and confuſed, yet an accurate obſerver will find, that they are proper and neceſſary to the methodical arrangement, and the minute and nice diſpoſition of Shells Dr. Liſter propoſed.

This difference in the ſeveral copies has induced a French author, Mr. Davila, in his Cabinet, vol. iii. p. 231, to give a collation of his copy with that in the king of France's library, from M. de Bure, who in the ſecond volume of his Bibliographie Inſtructive, has alſo many pertinent obſervations of the different times of taking off the plates: by the account M. de Bure gives, it appears that the French king's copy is a very perfect one, and was preſented to that Royal Library by Dr. Liſter himſelf.

I have alſo collated ſome copies of this work, and found them all to diſagree: the moſt perfect copy in London is ſaid to be in the library of the College of Phyſicians.

Some foreign Naturaliſts have been pleaſed to call Liſter's Hiſtory a dry and ſterile work, alluding to its having no deſcriptions, but only ſynonyms, though in all other reſpects they extol it greatly. But Mr. d'Argenville has carried his cenſures on it beyond prudence or ſenſe: therefore it behoves me to take ſome particular notice of that author.

For example, he inſinuates, that of the firſt book of terreſtrial Shells, three parts of them are known to be marine ones. Later diſcoveries, without any accuſation of Liſter, may have illuſtrated this point ſince his time, were it really ſo; but, on the contrary, it appears to me an erroneous aſſertion.

His next criticiſm ſhews him diveſted of common grammatical knowledge: his words are, the third book of Liſter is of Bivalves; he mixes the families with the Murex or Rock, and calls ſome Pecten Muricatus, Spondylus Muricatus, &c. Argenville certainly might have ſpared the preſs from groaning under ſuch trivialities, had he known common expreſſion: for the word *muricatus* has no dependence on *murex* at all; it is an adjective, of itſelf grammatically ſignifying any ſubject rugged, or full of ſharp points. Yet this poor critick would ſtrive to prove, that Liſter, by his Pecten or Spondylus Muricatus, joins, as he expreſſes himſelf, two different families of Shells together, and means a Rock Turbinite Eſcallop, or Rock Turbinite Spondyle: whereas he means no more than a Muricated or Thorny Eſcallop or Spondyle, without any relation or tendency to the Murices or Rock Turbens. He alſo criticiſes Liſter's adjectives of *margaritiferus* and *echinatus*, in a like ignorant manner; for the former term ſignifies only a pearly-coated Shell, or, as the French even now anſwerably expreſs it, *une Coquille Nacreé*; and the latter, or *echinatus*, only a Shell ſet with thorns or ſpines, like the Echini or Sea Eggs.

Another very detrimental and preſumptive criticiſm I muſt alſo take notice of; a few lines further, he tells you, that Liſter in his fourth book makes all univalve Shells Buccina; for example, the Limpet he calls Buccinum læve Diſſcoideum, or flat Buccinum, the Sea Ear Buccinum perforatum or perforated Buccinum. It is a falſe aſſertion, grounded on his ignorance of language: Liſter indeed intitles his fourth book de Buccinis Marinis; but there the term Buccinum is uſed by metonymy or tranſpoſition of names, for Univalves in general; for the term of Univalve is of modern date, and was never uſed by Liſter, nor any other author before him, or in his time. Thus a later author, Gualtieri by a like metonymy, calls his third part, which comprehends all the univalve turbinated Shells, Cochleæ Marinæ. Therefore you will find that Liſter, in the ſynonyms of each ſection or family, never repeats the term Buccinum again, but only the very generical name of the reſpective families, as Patellæ or Limpets, Vermiculi, Nautili, Cochleæ or Snails, Cowries, Rhombi, &c. and uſes it only again in the very genus of Buccina or Whelks, as the particular name of that family: and in like manner Gualtieri uſes the term Cochlea.

Theſe criticiſms, to diſparage Liſter's work, are cloſed by an inſinuation of a yet more hurtful and envious nature, viz. the very laſt lines of his account are thus worded: "One may ſay, that not any "author has thrown ſo much confuſion "on the Hiſtory of Shells as Liſter, other-

“ wiſe a good philoſopher, and a great
“ phyſician.”

I ſhould not have troubled my Readers with ſuch unentertaining criticiſms, had not Argenville’s Conchology been a work ſo greatly in vogue among the Collectors, and ſo univerſal, as it is wrote in French, the *faſhionable language*. Impreſſions therefore to the diſadvantage of Liſter, had not theſe erroneous inſinuations been hinted at, muſt conſequently have taken place in the minds of the curious in this branch of Natural Hiſtory, and have led them to reject a moſt excellent work for the trivialities of a writer of very inferior merit.

I will moreover be bold enough to aſſert, that Liſteri Hiſtoria Conchyliorum is a moſt uſeful work, as perfect as any other ſince publiſhed, and of great conſequence to thoſe who make the Natural Hiſtory of Shells their ſtudy.

There was publiſhed in 1770, another edition of this excellent work, in large folio, by the Reverend William Huddesford, of Trinity College, Oxford, and Keeper of the Aſhmolean Muſeum. I wiſh I could add more, than that the public is indebted to the late learned editor for the republication, as Liſter's work is become ſo ſcarce; but the indexes and other additions are very trivial, and there are alſo errors and inaccuracies in it which do no honour to Liſter's memory.

I do not think it unentertaining to relate ſome circumſtances relative to this uſeful and coſtly work which have occurred to me on the collation of many copies of the old editions of Liſter, and on a collation of numbers of his proof prints diſperſed among the curious by Dr. Liſter himſelf, before the names or numbers on the plates were added to complete the work: theſe proof prints, which are what the print collectors ſtile *variations*, will lead us into ſome curious particulars that otherwiſe would have been unknown.

Dr. Liſter, in 1678, publiſhed his Hiſt. Anim. Angliæ, in which he treats of the Engliſh Shells, and gives excellent figures of them, and good deſcriptions; he therefore deſigned this work (his Hiſt. Conchyl.) only for exotic or foreign Shells, as evidently appears from the proof head plates of the firſt book, N° 8, 25, 33, 40, 43, 63, 74, 83, 99, 108, 125, and 136, which are entitled Cochleæ, Buccina, &c. *Exotica*, but the word *Exotica* was eraſed when he changed his mind to make it a general hiſtory of Shells, which probably was at the ſecond book, and the eraſement of the word *Exotica* is even now plainly ſeen in all thoſe quoted plates.

Dr. Liſter, to complete his intended work, carried home all the ſhells ſingly to his daughters, to engrave on ſingle or detached copper plates (as is ſeen by the work), reſerving their arrangement till he had a ſufficient number, ſome not being done to his approbation, or getting better ſpecimens afterwards, he had them re-engraved, and therefore many Shells appear twice in his work, and in ſome copies only the firſt engraving, while in others only the ſecond engraving, is found; this circumſtance is alſo evident from the proof plates or variations.

Dr. Liſter undoubtedly publiſhed the firſt edition, in detached pieces, at different periods from 1685 to 1692; and I imagine a ſecond edition was publiſhed at one time, which was ſoon after the completion of the firſt edition of 1692.

I therefore think it a miſtaken notion that there was but one edition of this work, for certainly there were two; but as the title-page and heads of the chapters, &c. are plates with the engravers (his daughters) names, and bear the ſame date, they appear only as one and the ſame edition.

However, there are marks by which theſe editions may be diſtinguiſhed by an accurate critick, *viz.* 1. The ſecond edition has 75 Shells more than the firſt. 2. In the preface plate, p. 4, the third paragraph, begins *Septuaginta autem,* &c. the ſecond edition has *Centum autem,* &c. 3. In plate 7, which ſpecifies the places where they are found, the firſt edition has only one column of names, whereas the ſecond edition has a name, *viz. Fret. Magel.* in a ſecond column. 4. The title and all the head plates, as 1, 2, 3, 100, 106, 139, 140, &c. are printed, partly in black, and partly in red letters; whereas in the ſecond edition, only the title, plate 1, is printed in red and black letters, all the others being printed only in black letters.

In regard to the differences in the copies, it ſhould be obſerved, that as the work is entirely iconical, or conſiſts only of figures without any letter preſs, catch word, alphabet, or number to the pages, it was new and uncommon to the bookbinders: they therefore committed numerous miſtakes, and I attribute theſe differences to them and not to the work itſelf, which circumſtance thoſe who reject Liſter's work have not reflected on.

The third publication, in date of time, is Rumphius's Rarity Chamber of Amboina, in folio, printed firſt in Dutch at Amſterdam in 1705, another edition in 1711, and another in 1745. The little currency of the Low Dutch language, and its having only been tranſlated into German, and printed at Vienna, in folio, in 1766, has partly flung a miſt on this work; and the figures, in general very good and correct, have only been conſulted. However, Rumphius in his accounts of the Shells is very accurate, and is well worthy the peruſal of the ſtudent. It is indeed ſurprizing to me, that this work has never yet been tranſlated into a more current language, ſince it would be of great advantage to the knowledge of Shells, eſpecially thoſe of that part of the Eaſt Indies.

Petiver, in his Gazophylacium, has copied, in twenty-two plates, Rumphius's figures, both Cruſtacea and Teſtacea, with a meer nominal index; he ſtiles it Aquatilium Animalium Amboinæ, &c. Icones & Nomina, containing near four hundred figures; but never mentions Rumphius's name in particular, or as borrowed from him:——the figures are very indifferent, the ſubjects are confuſedly mixt, and the index is very trifling or uninſtructive, and often erroneous.

The Muſeum Kircherianum, by Buonanni, in folio, in Latin, Rome 1709; this work is rather the deſcription of the natural and artificial rarities of the collection of the famous and learned father Kircher, and not profeſſedly wrote on Shells; but as the twelfth claſs, or latter part, is intirely on Shells, with their figures and deſcriptions, to the number of about five hundred and eighty-ſix, this book has generally been eſteemed as a Conchology, or work on Shells.

It is, indeed, if I may ſo expreſs myſelf, another edition of Buonanni's former work, with additions; and the figures are in general good, but reverſed.

Janus Plancus de Conchis Ariminenſibus minus notis, in Latin, Venice, 1739, in 4to, with figures. Another edition in 1748, and another alſo in 4to. but with great additions, at Rome, in 1760. The plates are extremely good, and his accounts very learned. It is a natural hiſtory of ſome teſtaceous animals of Rimini, in the Adriatic ſea, more particularly of minute recent Cornua Ammonia and Orthoceratitæ, now firſt diſcovered in the ſea-ſands of that place.

La Conchyliologie of Mr. d'Argenville, in French, Paris, 1742, in 4to, with thirty-three plates: and a new edition in 1757, alſo at Paris, and in 4to, appears the next on the liſt.

This author has, in the firſt part of the work, not only treated his ſubject philoſophically, but alſo œconomically, in ten chapters, and a preliminary diſcourſe on the formation of Shells, the different methods of arrangement, the manner of cleaning them, their uſes, on foſſil Shells, and their origin, and an account of the principal Muſea of Natural Hiſtory now in being.

The other part is the hiſtory of the Shells, ranged in their reſpective claſſes, with proper tables and characters, Indexes, and remarks to each. The plates are twenty-nine in number, for the moſt part elegantly and correctly engraved from the author's own deſigns. Twenty-eight of them amount to near five hundred figures of recent ſhells; the laſt, or twenty-ninth plate, is of foſſil Shells. The deſcriptions of the Shells which accompany the plates are generally too conciſe or rather imperfect.

This work in the whole is excellent, though not perfect, as it does not comprehend the whole ſeries or ſpecies of Shells diſcovered : but, as the author himſelf obſerves, it is only a number of the fineſt and rareſt ſea, river, and land Shells, many of which have never been engraved before. The expence, ſays he, would have been too great to have engraved all that are methodized in the work ; beſides that the greater part are to be found already figured in Buonanni, Liſter, Rumphius, and other Conchologiſts.

The ſecond edition is augmented by three elegant plates, containing thirty-three univalves and eight bivalves, with their deſcriptions, and the Zoomorphoſe or repreſentation of the animals which inhabit the Shells.

This curious addition, or account of the animals, is illuſtrated by nine elegant copper-plates of them and their Shells, of the different families, as well natives of the Indies as of Europe.

Gualtieri Index teſtarum Conchyliorum, &c. in large folio, in Latin, Florence, 1742. This work contains one hundred and ten plates of Shells, beſides ſeveral large tail-plates of Corals. The figures in general are extremely good and accurate, but are oddly placed on their tips or points, as if ſpinning. The reading or explanation of the Shells, not Corals, conſiſts meerly of his own ſynonyms, ſometimes ſomewhat deſcriptive, without any ſynonyms or references to other authors: ſo that it is a meer Index, or very ſterile and imperfect. Beſides the dedication to the Emperor Francis III. alſo great Duke of Tuſcany, ſome account of the work is given in ſeven other pages, and a Syſtem of Tournefort, never before publiſhed, and his own arrangement, in ſix other pages.

Jacobi Theodori Klein Tentamen Methodi Oſtracologicæ, ſive Diſpoſitio Naturalis Cochlidum & Concharum, in ſuas claſſes, genera, & ſpecies, Iconibus ſingulorum generum Æri inciſis illuſtrata, &c. in Latin, at Leyden, 1753, in 4to. This work exhibits Klein's Syſtem of Shells, with the ſynonyms of authors, and Indexes of all Liſter's Shells diſpoſed according to his method. It has twelve plates, which are but indifferent; and to it are added two diſſertations, viz. on the form, growth, and colours of Shells, and a critical one on Pliny Hiſt. Nat. lib. ix, c. 33, of the differences of Shells.

George Geve, a celebrated painter at Hamburgh, publiſhed a work on Shells in German and French, intitled, The Monthly Pleaſure of Shells and Sea Productions, with illuminated plates, at Hamburgh, 1755, in large 4to. This work only gave the Deſcription of the firſt five families of Shells, and was well received by the public, but, being pirated, was diſcontinued. It had a ſyſtematical order for a ground-work; there are only twenty-four plates publiſhed, with 265 figures of Nautili, Poſt-horns, Dolphins, and other

Snails and Nerits; but the deſcriptions reach no farther than the 175th figure, and are compriſed in fifteen pages, columnwiſe.

[a] A Treatiſe on Shells and other marine bodies of Amboina, and the neighbouring iſlands, by Francis Valentyn, Clergyman, at Amboina, Banda, &c. with fine cuts; as alſo Notices, ſerving as a Continuation to Rumphius's Rarity Chamber, Amſterdam, 1754, in folio. This work is in Dutch. In the account of the Eaſt Indian Shells the author follows Rumphius chapter by chapter, makes additions to their Indian names, their places where found, their varieties, and the new ſpecies diſcovered; he further notices the Shells

---

[a] Verhandeling der Zee Horenkens en Zee gewaſſen in en omtrent Amboina, en de Nabygelegene Eilanden Door Francois Valentyn, in zyn leven bedianaar des Goddelyken woords in Amboina, Banda, enz. Met zeer Nette Prentverbeeldingen Verrykt. als mede Het Afbeeldzel van den Schryver. Diende tot een vervolg Van de Amboinſche Rariteitkamer beſchreven Door G. E. Rumphius,

of any rare or valuable ſpecies, as the Ventletrap, Admirals, &c. in whoſe collections they are, and their original prices.

He gives like accounts of the Weſt Indian and European Shells; as alſo enumerates the collections made by the Dutch in the Eaſt Indies, from Rumphius's going there in 1655, and of the chief collections in Holland, with liſts of the moſt capital Shells in each collection.

The whole is embelliſhed with ſixteen copper-plates of Shells, well engraved, containing one hundred and four univalves and thirty bivalves.

This is a curious but not a ſcientifical work. And in two large, or ſheet plates, wherein he has figured ſome ſea plants, and ſome fiſh, he has given a fine figure of a Mermaid as vulgarly painted; this ridiculous circumſtance alone has degraded his work among the *too lively* collectors.

Les Delices des Yeux & de l'Eſprit, ou collection generale de differentes Eſpeces de Coquillages que la Mer renferme, communiquée au Public, par George Wolffgang Knorr, à Nuremberg, Partie I. 1764. II. 1765. III. 1768. IV. 1750. V. 1771. & VI. 1773. The five firſt parts contain each thirty plates, and the ſixth part forty plates, beſides the letter preſs or their deſcriptions in French, the Indexes, &c. This work treats of the Shells without any order or ſyſtem, and the figures are for the greateſt part extremely well done.

Adanſon, Hiſtoire Naturelle du Senegal, tom I. Les Coquillages, Paris, 1757, in 4to. in French. This author is a topographiſt, or deſcriber of a particular country, viz. Senegal in Guinea. The firſt part of the book relates to his voyage and reſidence there from 1749 to 1753. In this relation he only notices the particular cuſtoms, &c. of the people, and the occurrences which happened to him; and informs us, he deſigns to treat of the natural hiſtory, fully, in other parts of the work; he therefore begins with the hiſtory of the Teſtaceous animals of Senegal, which makes the ſecond part of this volume, and is the only one, to my knowledge, he has yet publiſhed.

This Natural Hiſtory of teſtaceous animals is illuſtrated with nineteen copper-plates, not only of the Shells, but even of the fiſh of each family, to the number, as he tells us, of one hundred and eighty-five ſpecies, and above four hundred figures: they are moſtly well engraved and correct.

Seba's Muſeum, intitled, Theſauri Rerum Naturalium locupletiſſimi Alb. Sebæ accurata Deſcriptio, cum Iconibus, &c. printed at Amſterdam in 1758, in large folio, in Latin and French. This is the third volume of the deſcription of the fine collection of Natural Hiſtory of Albert Seba, an apothecary, at Amſterdam; which noble collection has ſuffered the fate of moſt others, and is now diſperſed.

This third volume treats on marine ſubjects, as fiſh, cruſtaceous and teſtaceous animals, and corals ; and the Shells alone make a great part, for the whole volume is illuſtrated with one hundred and ſixteen plates, of which from plate thirty-five to ninety-four are all of ſhells.

Seba's is a moſt coſtly and noble work, but without any prejudice might have been rendered leſs expenſive and more uſeful, by numbering the Shells, which is wanting in ſome plates, and alſo by retrenching many of them, and the repetitions of the ſame Shells to form compartments and Shell-works, as they were placed in his collection ; as for example, plate 35, 36, 37, and 85, which are whole ſheets, ſhewing compartments, flower-works, and carvings on Nautili ; and the repetitions of the ſame ſhells in other plates, eſpecially 53, 58, 90, 92, &c. a prodigious expence, and of no utility whatever. The engravings in general are correct, and the deſcriptions good.

Recueil de Coquillages, de Limaçons & de Cruſtacés, peints d'apres nature, gravés en taille douce, & illuminés de leurs vrais couleurs, par Francois Michel Regenfus, and publiſhed by the order of the king of Denmark at Copenhagen, in 1758, on a very large folio paper.

This royal work has twelve plates finely illuminated; and the letter preſs, which is in German and French, contains, beſides the dedication and preliminary epiſtle, the Natural Hiſtory of Shells, in two parts. Part I. conſiſts of twenty-eight pages; and part II. of fifty-four pages. A ſecond volume of this work has been begun, and a conſiderable progreſs is made in it; but as the ingenious author colours every plate by his own hand, the progreſs is conſequently ſlow.

Martini on Shells, intitled, the New Syſtematical Cabinet of Shells, by Frederick William Martini, printed at Nuremberg, 1768, in 4to*.

---

* Neues Syſtematiſches Conchylien Cabinet Geordnet und beſchriben, Von Friedrich Heinrich Wilhelm Martini, &c. Nurnburg.

This publication is the firſt number, or part, of a Conchology, deſigned to be given at different periods, by the ſaid Mr. Martini, a phyſician at Berlin; the reading is German. This firſt part contains the families of Worms, Limpets, Sea-Ears, Nautili, and other chambered Shells; and has twenty-two plates, beſides head and tail plates of Shells and their fiſh, and of Corals.

The twenty-two plates are coloured, the head and tail pieces are only printed in red, and are good; but many of the plate-figures are very incorrect, and the colouring is too glaring and unnatural. This author, however, is more hiſtorical and accurate than any other, and his ſynonyms or references of authors are moſtly very correct, and his deſcriptions good.

The ſecond part, which compleats a firſt volume, was publiſhed in 1769: this contains from plate 23 to 31, and in all to 340

340 figures, and their deſcriptions; it exhibits the families of the Bullæ and Cowries.

The third part was publiſhed in 1771: it continues the hiſtory to figure 415 and to plate 45, figure 481; and comprehends the families of helmets, veneroidæ, cylindroidæ and cylindars or olives.

A new anonymous Conchology began to be publiſhed in this Metropolis in 1770, in folio, illuſtrated with copper-plates. It was to be publiſhed in monthly numbers, and each number to contain two plates of Shells, with their deſcriptions in Engliſh and French. It was alſo intended to be a General Natural Hiſtory of Shells, and to include the figures of all the known ſpecies, common as well as rare, beautiful, or otherwiſe; and ſome copies were deſigned to be accurately coloured for the uſe of the curious. Six numbers of it were publiſhed, comprehending the families of the Limpets, Sea-Ears, and Worms; but not meeting with ſuitable encouragement, the authors have laid it aſide, at leaſt for the preſent.

Natural hiſtories, without figures of the objects, are at beſt imperfect; for at one view figures impreſs the idea of the body much ſtronger than the moſt finiſhed or accurate deſcription. It is for that reaſon, in the above liſt of authors, I have only mentioned thoſe with figures, as they of courſe muſt ſtrike the mind, and aid the knowledge of the ſtudy.

However, it remains yet requiſite to recite ſome few other writers, who, though they have not illuſtrated their works with proper figures, ſtill merit attention.

The firſt of theſe is John Daniel Major, a phyſician of Kiel, in Holſtein, who republiſhed Columna's excellent work De

Purpura, with learned annotations, ſo early as 1675, at Kiel, in 4to*.

He therein gives a method or ſyſtem of teſtaceous animals, which he pretends will immediately, on inſpection of any one ſhell, capacitate a perſon to place it in its proper rank. For this purpoſe he forms ten tables, which are too prolix to ſpecify here. It is proper to obſerve that his chief merit conſiſts in being the firſt who has formed a method of Shells; for it is more ſpeculative than practical. It is indeed only good to ſhew at one view all the different forms of Shells, for he does not properly diſtinguiſh their genera and ſpecies.

---

* Fab. Columnæ Opuſculum de purpura, cum Annotationibus Joh. Dan. Majoris, cui adjecit ſpecimen de teſtaceis, ad prædictas annotationes illuſtrandum, & inſuper ad Conchylia & Teſtacea reliqua in Principum Conclavibus diſponenda facile inſerviendum, cum Dictionario Oſtracologico, Keil, 1675, 4to.

The next in date is Langius*, a phyſician of Lucerne, in Switzerland, who, in 1722, publiſhed, in a thin quarto, in Latin, a New and Eaſy Method of Shells, diſpoſed in their due claſſes, genera, and ſpecies, but without a ſingle figure.

This author, in his title-page, which is very prolix, gives us his reaſon for not having figures, as he refers to the icons, and recites the ſynonyms of the chief authors on Conchology, and gives ſufficient characters to his claſſes and genera; he further notes, that his work was principipally deſigned to elucidate the foſſil teſtaceous remains.

---

* Caroli Nicolai Langii, &c. Methodus Nova & facilis Teſtacea Marina, pleraque, quæ huc uſque nobis nota ſunt, in ſuas debitas & diſtinctas claſſes, genera, & ſpecies diſtribuendi, nominibuſque ſuis propriis ſtructuræ potiſſimùm accommodatis nuncupandi, &c. &c. Lucernæ, 1722, 4to.

Breynius de Polythalamiis, Dantzick, 1732, in 4to. has given us, from p. 3 to p. 5, his thoughts on Shells, and a ſhort ſyſtem : which ſcheme he afterwards printed in a looſe ſheet, without date, place, or author's name.

The fourth author is the celebrated Linnæus, who, in his ſeveral editions of his Syſtema Naturæ, has methodized the teſtaceous animals ; but more fully in his laſt or twelfth edition, publiſhed at Stockholm, in 1767, in 8vo. This learned naturaliſt has given a few bad figures, in ſome of the former editions.

Mr. Davila, in his Catalogue Syſtematique & Raiſonné des Curioſités de ſon Cabinet, printed at Paris, in 1767, in French, in three volumes in 8vo. This fine collection was ſold at Paris the following year. The firſt volume only treats of Shells, and is illuſtrated with twenty plates of rare ſpecies. Moſt of the figures are good ; and this work, though a meer catalogue of the ſale, contains many curious and intereſting particulars.

Another 8vo catalogue of a ſale, intitled, Catalogue Syſtematique des Coquillages de Arnold Leers de Rotterdam, ſold in May, 1767, at Amſterdam. This catalogue was wrote by Mr. Fred. Chriſtian Meuſchen, Envoy for ſome German Princes at the Hague. It contains a ſheet ſyſtem of Shells, beſides many obſervations diſperſed in the catalogue.

The laſt work I ſhall particularly recite is a ſmall book, printed at Paris, 1767, intitled, Conchyliologie Nouvelle et Portative, in which, like as in a Dictionary, the Shells are recited in an alphabetical order. It is a very inſtructive book, and worthy the peruſal of every collector.

There are ſome other treatiſes on Conchology, which are rare, or little known; as, V. A. Walenbroceji Cochlearia Curioſa, Leipſ. 1674, 8vo. & Jo. Ern. Hebenſtreit de Ordinibus Conchyliorum Methodica ratione inſtituendis, Leipſ. 1728, 4to, &c. Beſides which, moſt of the naturaliſts and muſeographiſts have included Shells in their works, as Ariſtotle, Pliny, Bellonius, Rondeletius, Geſner, Aldrovand, Imperatus, Wormius, Calceolarius, Moſcardo, Grew, Vincent, Sloane, Petiver, and a number of others.

SECTION III.

HAVING finiſhed the review of the authors on this branch of Natural Hiſtory, I ſhall proceed on two other general points, viz. of the uſes of Shells, and inſtructions for collecting, cleaning, and preſerving them.

I obſerved on ſetting out, that this part of the creation ſeems more adapted as a link or harmony of Nature, than as œconomical, or of immediate uſe to mankind. Moſt part of the animals are nouriſhing food, though not ſolely or for conſtancy, as beaſts, birds, fiſh, and vegetables are; not any nation, to my knowledge, having been mentioned to ſubſiſt on them alone. In medicine their ſhells or habitations are of ſome uſe; and, in agriculture, a manure of recent ſhells, ſea-ſand, or comminuted ſhells, and the foſſil ſhells of the craig-pits in Suffolk, and of the falunieres in France, are in great eſteem.

The beauty, politure, and hardneſs of ſhells, render them very fit for luxurious uſes; and toys and ornamental utenſils, &c. are frequently made of them.

The morbid ſtate of ſome ſpecies of bivalves yield, next to foſſils, the moſt precious and valuable luxurious article of any other parts of Nature, I mean Pearls.

Before the diſcovery of ſilk and of cocheneal, this branch of Nature yielded two other luxurious articles to civilized nations, which, by theſe diſcoveries, are now rendered of no value and uſeleſs; to wit,

The Tyrian purple, made from the liquor of a ſpecies of turbinated univalves firſt diſcovered at Tyre, and for which that city was famous, this dye was accounted ſo beautiful and ſo precious, that it became a peculiar mark of royalty and grandeur.

However, later diſcoveries prove, that it is not peculiar to one ſpecies only, but that ſeveral kinds, nay, different families, afford and effund this purple juice: indeed a whole family of Shells ſtill retain the name of Purpuræ, or purples, from this property.

The fame and coſtlineſs of the dye, the manner of dying, the prodigious prices, and all other particulars of it, which are foreign to my preſent purpoſe, may be ſeen in the Grecian and Roman naturaliſts Ariſtotle and Pliny, as alſo in Aldrovandus, Columna, and other modern writers.

The coſtlineſs of the dye proceeded from the ſmall quantity of the purple liquor each ſhell fiſh yielded; and that it was abſolutely neceſſary to get it from the fiſh when alive and freſh; and alſo, that myriads of animals ſcarcely yielded liquor enough to dye a mantle.

But the cocheneal inſect, an American product, quite unknown to the antients, which affords ſo fine a ſcarlet dye, being now got in quantities, and to be uſed, preſerved, or dried, and at all ſeaſons, makes it not only cheaper, but more uſeful; and therefore has now intirely overthrown this rich or royal dye of antient times.

However, authors ſay that it is ſtill in ſome uſe in the Spaniſh America: we have a ſpecies of purple ſhell-fiſh on the coaſts of Somerſetſhire, Cornwall, and other parts of England, alſo on ſeveral coaſts of France, and other parts of Europe; but no other uſe is made of them than to mark linen, and no lixivium or art can efface the colour. Mr. Cole gives a very curious account of the Somerſetſhire Shells in the Philoſophical Tranſactions *; and Mr.

---

* Phil. Tranſ. N° 178, table iii. fig. 3, 4, 5, 6, 7, by Mr. William Cole of Briſtol. It is a white vein, lying tranſverſely in a little furrow or cleft, next to the

Mr. Du Hamel of thoſe of France, in the Hiſtory and Memoirs of the Royal Academy of Sciences of Paris.

The Byſſus of the antients, which I am convinced was made of the beards of the Pinnæ Marinæ, or Sea Wings, and ſuch like bivalves. The Pinnæ Ma-

---

the head of the fiſh, which muſt be digged out with the ſtiff point of a horſe-hair pencil.

The letters, figures, ſpots, or what elſe ſhall be ſo made, will preſently appear of a pleaſant *light green colour* ; and, if placed in the *ſun*, will change into the following colours; Firſt, *a deep green*, then a full *ſea-green*, after into a *watchet blue*, then into a *purpleiſh red*, and laſtly, into a very deep *purple red*, beyond which the *ſun* can do no more. But then the laſt and moſt beautiful colour, after waſhing in ſcalding water and ſoap, and dried in the *ſun*, will be of a fair bright *crimſon*, or near the *Prince's* colour, which will continue, though there is no uſe of any ſtiptic to bind it.

The changes of colours are made faſter or ſlower, according to the degrees of the *ſun's* heat.

While the cloth ſo dyed lies in the ſun, it will yield a very ſtrong fœtid ſmell, like *garlick*, or *aſſafœtida*.

rinæ, by ſome are called the *Silk-Worms of the Sea.* They have beards, by which they faſten themſelves to the rocks, &c. of fine, long, gloſſy ſilk-like brown fibres, which are eaſily wove into a ſilken ſtuff. There are now manufactories of it at Naples, Meſſina, and Palermo.

Thoſe bivalves, ſays Mr. Adanſon, which have ſuch beards, (for only bivalves are yet diſcovered to have them) have them ſometimes in ſeparate fibres, as the Pinnæ and Muſcles, or united, as it were, into one nerve, as the Arks. Theſe threads, or fibres, proceed from the beginning of the pedeſtal of the fiſh, and are analogous to the hair of other animals, or the nerves and fibres of Quadrupeds. The Shells which have theſe beards remain fixed in the ſame place; and when the fibres, or threads, are cut, or broken off, they immediately ſpin, or form new ones, with their pedeſtals, which is the part that conducts the work, and by this means refix themſelves to the rocks, or other immoveable places they meet with.

In regard to inſtructions for collecting, cleaning, and preſerving Shells, fit for obſervations or cabinets, I ſhall offer the following hints:

For collecting. It is always neceſſary, if poſſible, to get them alive, or with the animals in them. It not only inſtructs us in the natural hiſtory of the very animals, a part extremely uſeful to a thorough knowledge of Shells, (though as I have already advanced, it is not neceſſary to form the method or ſyſtem of them) but it alſo preſerves the Shell in its perfect nature and beauty; for only live Shells bear the full glow of their colours.

When any Shells with their fiſh are collected, I would not have them immediately killed, but kept for a few days in their native ſea water (not longer, for the fiſh waſting or dying in the Shells muſt neceſſarily hurt them) to make obſervations, if poſſible, of their motions, ways of life, &c. and ſome deſcriptions of them; for univalves, principally, if with or without horns, their figure and ſituation, and the form of the pedeſtals, &c. In regard to bivalves, I do not find any particular part is eaſily obſervable, that is, without anatomy; therefore the whole form, colour, and other remarkable and very obvious parts, are only neceſſary to be deſcribed. Theſe obſervations are pretty eaſily made, and without any great aſſiduity; but, ſhould the perſon who collects them be of a curious and inquiſitive nature, he may puſh his reſearches to what extent he pleaſes, to the advantage of Natural Hiſtory.

Live Shells may be fiſhed up by drag-nets, the log-line in ſounding, the cable in weighing anchor, or ſuch-like workings.

The collector muſt likewiſe have ſome judgment in the picking of ſuch Shells, for ſometimes they are found, though alive or with the fiſh in them, bad, or worn through age, pierced with worms, or other accidents, which makes them yellow, livid, and imperfect.

All ſpecies of Shell-fiſh, like other animals, have their particular or peculiar reſorts; ſome are pelagian, or inhabit only the deeps of the ſea, others keep in leſs depths; ſome in ſhallows and in bays; and ſome are even littoral, or inhabit the very ſhores.

However, let their reſort be what it will, get the Shells from the deeper parts of thoſe reſorts; for, if in too ſhallow water, they are more expoſed to the ſun, or other accidents, which hurt them much.

It has been obſerved, that as fine ſpecies as any are met with in narrow ſtraits between iſlands, and in bays; as alſo ſhallows of four or five fathom water.

After violent ſtorms live Shells may be picked up on the ſea beaches or ſhores, as the great agitation of the water, during thoſe hurricanes, raiſes, and brings them from their native beds. But then they muſt be collected as ſoon after the ſtorm as poſſible, the ſun fading their colours, and ſpoiling their beauty. As for Shells that have lain ſome time on the ſhores, known by the name of *Dead Shells* among collectors, they are ſeldom of good colour, by being expoſed to the ſun, and are alſo often imperfect, from being bowled to and fro, and by that means worn and broken.

Of the Shells that adhere to rocks, bottoms of ſhips, &c. always chuſe thoſe which lie under water.

Land and River Shells are more eaſily obtainable; and the collector needs no other inſtructions, but only to be judicious in his choice.

The River Shells in general are obſerved not to be of a pleaſing colour, or to have any great variety of colour; therefore, in that point, they are leſs curious than the Land or Sea Shells.

River Shells are moſt generally alſo extremely thin, ſome have even imagined it a character to diſtinguiſh them; but they are miſtaken, for though in general River Shells are thin, yet we find Sea Shells as thin; witneſs the Cymbia, or Paper Nautili, ſome Pinnæ, and many other Sea Shells, as alſo many Land Shells.

The above is ſufficient for collecting Shells. Now, to preſerve them. As Shells are of a calcareous nature, all acids ſhould be avoided as much as poſſible; and even when you kill the fiſh, as continued boiling them may detriment the Shells, I would adviſe only to give them a quick dip in ſtrong boiling water, which alone will kill the fiſh: and ſoon after, but giving them time to diſcharge the heat acquired by dipping (that they may not imdiately paſs from one extreme to another, or from hot to cold, and by that ſuffer ſome injury), fling them into pure cold water, to lie till you intend to clean them, or for ſome little while.

As by being thus managed the fiſh becomes condenſed, or ſomewhat ſolid, it is afterwards eaſily picked out of its ſhell by pins, or ſuch ſharp inſtruments.

The above is meant for turbinated univalves only; for as to Limpets, and ſuch open Shells that are not ſpiral, and all bivalves, the fiſh are eaſily got out with a knife: however, care is to be taken not to cut, or otherwiſe hurt the ligaments or muſcles of them, nor to miſmatch the Shells, ſhould you happen to ſunder or ſeparate them.

In cleaning or preſerving Shells for cabinets, take the following hints: Let them not be touched much by aqua fortis, or by any other acid, as oil of vitriol, ſpirit of ſalt, or even vinegar; nor be boiled, or expoſed to the heat of the fire, or ſun, for they greatly ſpoil them.

Many Shells are fiſhed up extremely beautiful and poliſhed, ſo perfectly, that art cannot better it. Theſe need only be ranged in their reſpective claſſes: ſuch are the Cowries, Tuns, ſome Buccina, the Volutes, and the Olives.

Others, on the contrary, come out of the ſea ſlimy, and even ſometimes covered and encruſted with filth, coralline matter, moſs, &c. and have a pellicle or epidermis; ſuch are the Tellens, Muſcles, Snails, &c. For theſe, firſt ſteep them a day in hot water, to ſoften the filth or cruſt, then bruſh them very much (but the bruſhes ſhould not be too hard);

if that does not compleat the cleaning, I would adviſe to rub or bruſh them again with tripoli or emery, or a weak acid, or with a ſtronger one, much diluted with water; always taking care to dip them every minute in clear cold water. Strong ſoap may alſo be uſed with a rag or piece of woollen or linen, with which rub them; and when ſufficiently cleaned this way, a fine bruſh, with fine emery, will finiſh the whole. But all theſe proceſſes muſt be judiciouſly managed according to the attendant circumſtances, which it is impoſſible to regulate in writing.

The ſcientifical collectors, or naturaliſts, are always deſirous of having the Shells in their rough ſtate, or juſt as they are fiſhed. This method, though extremely uſeful, is not to be abſolutely followed; not only becauſe their beauties would be loſt, but alſo on account that the ſpecies differing in colours could never be truly defined. However, as a medium, I would adviſe all collectors to have ſome Shells of each genus in their rough ſtate, while the others ſhould diſplay their beauties by all the accompliſhments of art: and a more eaſy medium may be kept in bivalves, by one ſhell or valve being rough, while the other is poliſhed.

Numbers of Shells have an outer ſkin, or pellicle, different from the Shell itſelf, called the Epidermis. In regard to Natural Hiſtory, it is really of uſe to know the nature, colour, &c. of this Epidermis, as it often characteriſes ſome ſpecies, as much as any other part. I therefore would recommend a due notice or obſervation on it; and alſo to preſerve ſome ſpecimens covered with it: to enrich your cabinet with ſpecimens for knowledge, as well as for beauty.

The Epidermis, by its thickneſs, hinders a Shell ſometimes of being poliſhed. In that caſe, it muſt be wholly taken off with an acid diluted with water.

And afterwards it is to be bruſhed with a bruſh charged with emery, putty, or tripoli, till it becomes poliſhed, or gloſſy; but if, inſtead of a thick Epidermis, it is a meer pellicle, it is ſufficient to ſteep it in hot water, and then pick it, or ſlightly file it off. Vinegar, or a weak acid, is alſo good, and, indeed, much better than aqua fortis.

When the Epidermis is ſo very craſs, or groſs, that acids diluted, and even pure aqua fortis, does not do; ſtrong emery, with ſtrong bruſhes, ſeals ſkin, or pumice-ſtone, is ſometimes employed: if that does not do, the only way left, is to ſteep it in a cup of pure aqua fortis, in the following manner. Firſt ſtop or cover the mouth or opening of the Shell with wax, that the acid may not penetrate to, or touch, the inſide of it. And care muſt be taken, from minute to minute, or from time to time, to plunge it in clean cold water, and every time to examine what effects the acid has had. It is alſo neceſſary to cover with wax all the fine points or delicate parts of the Shell, to hinder the acid from any-wiſe corroding or hurting them: after which the whole Shell is poliſhed with fine emery, and paſſed over with gum-water, or whites of eggs.

A Shell of a ſmooth ſurface, or that is not very rugged, warted, or ſet with ſpikes, proceſſes, &c. and which naturally has ſome ſlight politure, though dull or deadiſh, ſhould only be rubbed with chamois leather by the hand. It will then become bright or gloſſy, eſpecially if a little very fine tripoli is uſed. Indeed, powder of emery ſhould not be often uſed, for it works rather too rudely. However, all theſe operations muſt be uſed and adapted to the circumſtances, otherwiſe they deſtroy or hurt the colours, and the fine workings on the Shell.

When the Shells are poliſhed enough, and quite dry, paſs them over by a fine pencil with gum arabic water; which glows the colours without hurting them, or even giving any ſmell, as varniſh does. Whites of eggs is alſo good; it is more glaring, but, however, it is ſubject to turn yellow in time.

The laſt and leaſt work to be uſed for Shells, is working or rubbing them quite down, ſo as to take off entirely their true and native coat. This is done by working them like agates, or other ſtones, on wheels ſmeared with emery. This work often quite ſpoils them, and very great care muſt be taken: however, they may be poliſhed by hard bruſhes of boars briſtles, with a turning machine.

Patience and judgment can only overcome working of Shells that are warped, rugged, bumped, thorny, &c. A bruſh or a feather can only be uſed to convey the aqua fortis on the parts required to be wrought on, and then it muſt be from minute to minute, ſteeped in clean water, to hinder the acid from corroding it too much; afterwards, like other Shells, they are to be poliſhed, or paſſed over with tripoly or emery: even then, all parts cannot be clean alike, and gum-water or whites of eggs muſt be uſed to thoſe leſs cleaned parts, to render them vivid; elſe they would ſhew but dull.

The rubbing down of Shells re-produces new ones, as they are called. Thus the Volute, called by us the *Purple* or *Violet* Tip, and by the French the *Onyx*, has a brown epidermis, which being taken off diſcovers the ground colour to be a dull yellow. When this is worked down to beneath the cruſt, or ſurface, it is of a pure white, with the tip of a fine violet colour.

The common Cowry, in like manner, is worked down to a fine violet.

The Nautilus, like many trochi, ſnails, and other Shells, works down to a fine mother of pearl; but, if only cleaned, it is ſullied white, with large fallow or yellowiſh rays.

The Sea-Ears alſo work down to mother of pearl, whereas, when only poliſhed, they are finely clouded brown, white, green, &c.

Many of the Limpets, when worked down, wear a very different appearance to what they do when only poliſhed.

Several other ſuch examples may be brought: but I neither applaud this, nor many other proceſſes and frauds, that are daily practiſed on Shells, which deſtroy their true or natural appearance.

The Dutch are very much famed for theſe practices; they even colour and file Shells to ſuch a degree, as to alter them quite: all theſe particulars are to be avoided by the judicious collector.

SECTION IV.

HITHERTO I have only treated of Conchology in general: I ſhall therefore now proceed to the particular parts, and begin with the ſeveral ſyſtems or methods of Shells eſtabliſhed by different authors; and alſo lay before my readers the arrangement I propoſe, that they may be able to judge how far any deviations I make from thoſe now eſtabliſhed are judicious or approveable.

The moſt general manner of the old authors has been, to divide all Shells into ſimple, turbinated, and bivalve. It is evident that this diviſion is very erroneous, as it entirely excludes the multivalves.

Succeeding writers, inſtead of this ſubſtituted three other diviſions, viz. univalves, in which they comprehend both the non-turbinated and turbinated; the bivalves and the multivalves.

To this laſt, which is the generally-received diviſion, I adhere: and I ſhall adopt the term Univalve now uſed, though it is not very proper. My only reaſon for ſo doing is, that cuſtom has ſtampt an authority on it; and I am unwilling to change a term now univerſally received, to avoid confuſion.

I proceed to the firſt diviſion, or univalves; but ſhall only take notice here, of thoſe authors who have treated Shells in a methodical or ſyſtematical manner. And

Firſt, Liſter, who begins with the land and freſh water univalves, in which, in regard to method, not any thing remarkable occurs; but in his fourth book he divides his ſea univalves into eleven families, viz. 1. Limpets. 2. Dentalia. 3. Vermiculi. 4. Nautili. 5. Snails. 6. Nerits. 7. Sea-Ears. 8. Trochi. 9. Cowries. 10. Rhombi, or Strombi; by which he means olives or cylindars, figs, and ſome other wide-mouth Shells, and alſo Volutes; and, 11. Buccina, which he ſubdivides into five ſets, viz. 1. Thoſe with a toothed columella or pillar. 2. Bilingues. 3. Ampullaceous, or bellied. 4. The Turban or Clavicle, and the top-lengthened or produced: and 5. The top or mouth no ways produced.

Liſter's above method is indeed very confuſed, and no wiſe to be followed. His 1, 2, 3, 4, 8, and 9th families are good. I think him right in making the Dentalia a diſtinct family from the Vermiculi: the former being always of a regular determinate figure; the latter, or Vermiculi, of a figure irregular and uncertain. His 7th family of Sea-Ears ſeems outrageouſly miſplaced between the Nerits and Trochi;

it

it ſhould be the 2d, or following the Limpets, to which they are nearly allied; and his 5th and 6th families, Snails and Nerits, are really only one: but the greateſt confuſion is his 10th and 11th families of Rhombi and Buccina: they are indeed ſo inextricable, that it is impoſſible to reduce them to any order, or render them uſeful to the ſtudent.

However, had Liſter but added an index of the numerous ſections, parts, and chapters, to his work, his Shells would be very eaſily traced, though they ſeem more confuſedly placed than in any other author. His arrangement, though not good in the whole, is ſo critically methodical, that a perſon the leaſt converſant in Conchology can immediately find if a Shell is figured by him or not. For example, his chapters of the Cowries are regulated as follows, viz. Cowries of one colour. 2d. Streaked. 3. waved. 4. Simply ringed or banded, and banded and ſpotted. 5. and 6. ſpotted or painted in a nettwork. 7. Striated. 8. Pimpled, or with prominent knobs. 9. Smooth-mouthed, or not toothed, as the Weaver's Shuttle, and the Poached Egg; and 10th. Umbilicated, as the Pewit's Eggs; which two laſt he places in the Cowry family. By this expoſition it is plainly ſeen, that, had he made an anſwerable index, a perſon might immediately find, without turning pages over or waſting time, whether Liſter figured the Cowry ſought for, ſooner than in any other author. However, I confeſs, I think it rather too much clogged, or circumſtantial.

An author, whom I did not mention in my liſt of writers on Shells, as being only a deſcriber of a muſeum, I mean Dr. Grew, in his account of the Royal Society's collection, has given us ſeven ſchemes, or ſyſtems of Shells. He divides all Shells in his firſt ſcheme into ſingle, not whirled and whirled; into doubles, or bivalves, and into multiple, or multivalves.

His ſecond ſcheme takes in the ſingle Shells not whirled: he conſtitutes three families of them, the Echini, the Patellæ, and the Aures Marinæ. His third ſcheme takes in the conic whirled Shells, as Murices and Olives. The fourth the oval whirled Shells. The fifth, Shells more greatly whirled or produced, as the Trochi, Strombi, Purpuræ, &c. The Sixth, Shells whoſe whirles or windings are latent or hid within their body, as the Cowries. But, however, all theſe his ſchemes are ſo puzzling, and without proper definitions or figures, that they are rather to be reckoned ingenious than uſeful.

Rumphius has the three diviſions of ſimple and turbinated Univalves, and the Bivalves; as for the diviſion of Multivalves, he has it not, but blends them with the other diviſions. His families are, 1. The Chambered Nautilus. 2. The Paper Nautilus. 3. The Cornua Ammonia, or Helix Snails, called Poſt-Horns. 4. The Cochleæ Lunares. 5. Trochi. 6. Cochleæ

Valvatæ, Nerits, or operculated Snails. 7. Helmets. 8. Murices. 9. Cochleæ Globoſæ. 10. Buccina. 11. Strombi. 12. Volutes. 13. Alatæ, as Spiders, Devil's Claws, &c. 14. Olives, or Cylindars, and 15. Univalve Shells, as Limpets, Vermiculi, &c. but every one of his families are ſo confuſed, that little aid to an arrangement can be gained from his work.

Langius diſcuſſes the general ſubject in ſix ſections, of which the fourth gives his characteriſtical notes from the whole ſtructure and figure of the Shell, or from the principal parts, viz. the aperture in the turbinated Shells, and the beaks (Umbones) in the bivalves. Other minor characters are their being ſulcated, ſmooth, &c. or from the different ſituations of the parts: And alſo negative characters that are common to other Shells, as, e. g. the character of the firſt claſs of Univalves is, that they are not turbinated, or turned in a ſpiral manner; and adds, that all characters laid down ſhould be ſuch as are ſtrong and viſible; and theſe characters ſhould always be kept in view by the writers who ſet them forth. He divides all ſhells into, 1. Simple Univalves, or thoſe that are not turbinated. 2. Turbinated Univalves, by which he only underſtands thoſe whoſe whole form is ſpiral, and not partly ſo, as is the Cyprea or Cowrie; and, 3. Bivalves.

His firſt Part, Simple Univalve Shells, or not turbinated, contains claſs 1. The Limpets and Vermiculi. Claſs 2. The Nautili, Nuces or Dippers, Cypreæ or Cowries, and Ammonia.

Part II. Turbinated Univalves. Claſs 1. Of a lengthened aperture, or the mouth open on the upper part; as the Volutes, Cylindars, &c. Claſs 2. Canaliculated, or whoſe aperture on the upper part ſtretches out into a long pipe or beak, as the Murices Purpuræ, Helmets, &c. Claſs 3. Whoſe aperture and tip are both lengthened, and whoſe firſt, or body ſpire, is remarkably ſwelled, as the Buccina, &c. Claſs 4. Whoſe firſt, or body ſpire, is narrow, or tapers with the reſt of the ſhell, as the Strombi, Mitre, Crane, &c. Claſs 5. Whoſe turban or clavicle is very produced or ſharp, as Strombi, Trochi, &c. Claſs 6. Thoſe Shells whoſe aperture and clavicle are little produced, as the Snails, Nerits, and Sea Ears.

Part III. the Bivalves. Claſs 1. Equal or ſimilar-ſided Bivalves, or whoſe cardo is central, as Cockles, Chamæ, Tellens, &c. Claſs 2. Diſſimilar or unequal ſided Bivalves, or whoſe cardo is not central, as Muſcles, Pholades, and many others; and Claſs 3. Conchæ anomalæ, or of unequal valves, as Eſcallops, Spondyles, Oyſters, &c.

It is evident, this arrangement of Langius is confuſed, and wants great correction.

Argenville divides all Shells into the three general claſſes, of Univalves, Bivalves,

valves, and Multivalves. The Univalves he arranges into fifteen families, viz. 1. Limpets. 2. Sea Ears. 3. Vermiculi. 4. Nautili. 5. Cochleæ Lunares, or round mouthed Snails. 6. Semilunares, or half mouthed Snails. 7. Flat mouthed Snails. 8. Buccina. 9. Turbines. 10. Volutes. 11. Rhombi, Cylindars, or Olives. 12. Murices. 13. Purpuræ. 14. Tuns: and 15. Cowries.

This author's method is very good; but, however, there is ſome confuſion in it; eſpecially in the following families, viz. 7. The flat mouthed Snails. 8. The Buccina. 12. The Murices; and 13. The Purpuræ. Beſides, a proper place is wanting for the Paper Nautili, which he very erroneouſly ranges with the chambered or common pearly Nautilus; but I ſhall refer to further particulars, when I treat of each family reſpectively.

Gualtieri arranges Shells into five parts, viz. Part I, Land and River Shells, both ſimple and bivalves. Part II. Sea Shells, that are ſimple or not turbinated, in two claſſes. 1. Simple, as the Limpets, Vermiculi, and Dentalia; and 2. whoſe fabric or ſtructure is latent, or hid within the body of the Shell, as the Paper Nautili, Pewit's eggs, and Cowries; or that are of a chambered ſtructure, as the Nautili, Cornua Ammonia, and Orthoceratitæ.

Part III. which he by metonymy calls Cochleæ Marinæ, as Liſter calls them Buccina, comprehends all the turbinated Univalves. He ranges them into the ſix following claſſes, viz. 1. Cochleæ Longæ, or the Volutes and Cylindars. 2. Cochleæ Canaliculatæ, as the Purpuræ, Murices, Winged Shells, Spiders, Helmets, &c. 3. Buccina. 4. Strombi, as he calls them; but are not the Strombi or Needles, properly ſo named, but Murices and Buccina. 5. Snails very lengthened or produced, as the Strombi or Needles, and Trochi: and 6. The ſhort Snails, or not much produced or lengthened, as the Snails of all kinds, Nerits, ſimilunar, round mouthed, Helices, &c. and with theſe he ranks the Sea Ears.

Part IV. Bivalves: and Part V. Multivalves, among which he places the Echini.

I ſhall comment very little on his ſyſtem, and only obſerve, that, in all his claſſes, there occurs an inextricable confuſion; and that he ſeems to borrow his arrangement chiefly from Langius.

Gualtieri has likewiſe favoured the learned with a publication of a manuſcript ſyſtem or arrangement of Shells by the celebrated Mr. Tournefort. This method has the three uſual and general diviſions of Univalves, Bivalves, and Multivalves. The firſt is ſimple Univalves, as the Limpets. The ſecond, the turbinated of all kinds; as Buccina, Cochleæ, Cowries, &c. and the third family is the tubular Univalves; as Vermiculi, Dentalia, &c.

Though Mr. Adanſon only treats of the teſtaceous animals of Senegal, and conſequently is a partial writer, or one that does not give an intire ſyſtem or Method of Shells, I cannot withhold mentioning him, as he is very remarkable. He ranges all thoſe he exhibits by the animals themſelves, and not by the ſhells or ſpoils: however, he gives ten tables of affinities of Univalves; that is to ſay, of the very Shells, founded on the ſix following parts; the ſpires; the top; the opening, aperture, or mouth of the Shell; the operculum or cover; the pearlineſs of the ſubſtance of the Shell; and its perioſte or epidermis. He likewiſe gives ſeven tables of affinities taken from the parts of the animals; as the horns, eyes, mouth, &c. and from theſe tables of affinities he forms his arrangement.

The above tables are exceeding ingenious, but uſeleſs: in that they are very perplexed, and require an intenſe ſtudy to unravel them: beſides, he has clogged the whole with ſuch unmeaning and ridiculous new names to his Shells, rejecting all former and received ones, that he makes himſelf very ſingular.

The vaſt and coſtly work of Seba offers next. It has no general ſyſtem or method; but the editor, in the index of the plates, (Plate 84,) exhibits an arrangement of the Univalves: and ſays, he hopes to publiſh his whole ſyſtem ſoon, which will comprehend the Univalves, the Bivalves, and the Multivalves, with their characters and diviſions.

The ſyſtem or method of Univalves he exhibits, contains fifteen families, to wit, 1. Cowries. 2. Tuns. 3. Nautili. 4. Semilunar mouthed Snails. 5. Round mouthed Snails. 6. Trochi or tops. 7. Strombi or Needles. 8. Olives. 9. Volutes. 10. Helmets. 11. Winged Shells. 12. Mu-

12. Murices. 13. Purpuræ. 14. Buccina. and 15. Sea Ears. All theſe families, ſays he, proceed from a ſpiral, which extends or widens more or leſs.

In the above work, as he mentions the ſpiral form only, he has neither placed the Vermiculi or the Limpets. However, in his ſyſtem he has given ſome figures of the former; but of the latter, or Limpets, he has neither figured or mentioned a ſingle ſpecies, in his whole work; which is very remarkable.

Breynius divides all Shells into two general diviſions of tubular or vaſcular: that is, into Shells that are hollow, or like tubes, and into thoſe that are like cups or veſſels. The firſt diviſion he ſubdivides into Monothalamias, or of one cavity; and into Polythalamias, chambered, or with many cavities. The ſecond into ſimple, as the Limpets; or compoſit, as the Bivalves and Multivalves. On this ſcheme he forms eight principal claſſes or families. viz. 1. Tubulus, or Vermiculus. 2. Cochlidium, or all turbinated Shells. 3. Polythalamia, or chambered Shells. 4. Limpets. 5. Conchæ, or Bivalves. 6. Conchoïdes, or Multivalves. 7. Balanus, and 8. Echinus.

It is evident this method is neither correct or clear, and therefore rather imaginary than uſeful.

Linnæus's ſyſtem places the teſtaceous animals in his ſixth claſs of Vermes, and begins with the Multivalves, follows with the Bivalves, and ends with the Univalves. He has fourteen families of the turbinated Univalves, and five of the ſimple, or non-turbinated.

His fourteen families of turbinated Univalves are, 1. The Paper Nautili. 2. The common or chambered Nautili. 3. The Conus or Volutes. 4. The Cypræa or Cowries. 5. The Bulla, in which are the Poached Egg, the Weaver's Shuttle, the

Pewit's Egg, the hump-backed Cowry, vulgarly ſo called, the Figs, the Turnip, &c.

The ſixth family is the Voluta, in which not one Volute, commonly and properly ſo called *à volvendo* is inſerted; but conſiſts of Midas's Ear, Cylindars, Olives, and their congenera, Tower of Babel, Biſhops Mitre, Tiaras, Muſics, and Devils.

Seventh family Buccinum, in which are the Helmets, Harps, Perſian Conques, and Strombi.

Eighth family Strombi, as Spindles, Spiders, and Winged Shells.

Ninth family the Murices.

Tenth family the Trochi of all kinds.

Eleventh family the Turbo; in this he comprehends all ſuch Shells that run between the Buccinum and Cochlea, as the Periwinkle,

winkle, the Ribband Snail, the Serpent's Skin, the Gold and Silver Mouths, the Dolphin, the Wintle Trap, the Grub, and ſome Strombi.

The Helix, or twelfth family, in which he includes all the horny or ſemipellucid Univalves that are very thin and brittle; as the common River Buccina, Pomatia, &c.

The thirteenth family is Nerita: and he places therein only the true Neritæ, as Green Peas, Painted Nerits, Magpies, &c.

The fourteenth family is the Haliotis, or Sea Ears.

The next are the ſimple, or not turbinated Univalves: as fifteenth, the Patellæ or Limpets, Sixteenth, the Dentalia. Seventeenth, Serpulæ, or Vermiculi. Eighteenth, Teredo, or Ship Worms. And Nineteenth, Sabella, or ſuch whoſe tubes are made of grains of ſand like the caddos worms.

I ſhall take more particular notice of theſe families, when I treat reſpectively of them in my ſyſtem or method: and at preſent ſhall only make a general remark, viz. that his ſixth, ſeventh, eighth, and twelfth families are very confuſed. His ſeventeenth and eighteenth may with propriety be made one family only; and, as for his nineteenth, or Sabellæ, I muſt needs own, I do not think they can ſtrictly be denominated teſtaceous, as they are only tubular ſtructures, made up of meer grains of ſand united together, like thoſe of the caddos.

This moſt juſtly celebrated naturaliſt, notwithſtanding the great adoration paid to him through Europe, I will be bold enough to declare, merits great and ſevere cenſure, for changing long-received and authorized names, to others which have as long and conſtantly conveyed a different received idea or meaning. Thus, the Greek name Lepas, always ſynonymous with the Latin name Patella, the latter ſignifying little ſacrifice-diſhes, or ſaucers, was given to the Limpets, from the earlieſt Grecian times, and the Roman name from their reſemblance to thoſe little diſhes; yet, Linnæus wantonly tranſpoſes the name of Lepas to the Balani; multivalves conſtantly ſo named from a fancied reſemblance they bear to acorns, and thereby not only overthrows cuſtom, but reaſon; for the ſimilitude to other objects, from which theſe very bodies received thoſe original names, are by him equally tranſpoſed with the very names: for certainly the Balani, though they do not very greatly reſemble acorns, leſs reſemble platters or ſaucers. In like manner, the common received name of Voluta, from *à volvendo*, or rolled up, which theſe ſeem to be, he changes to Conus; and claps that very rejected name on another family, wherein he does not place a ſingle ſhell of that kind, always known and diſtinguiſhed by the name of Volutes, or of a roll ſtructure. And again, family eighth he calls Strombi; which contains not one Shell hitherto known by that name; and the very

Strombi, or, as commonly ſo called, he places in family ninth, which he names Murex.

Such tranſpoſitions of names, from one object to another, is not a trivial affair: it creates a vaſt confuſion in ſcience. Names given to bodies that are univerſally authorized and adopted by cuſtom, though they are not even very appoſite or proper, ſhould be kept ſacred, and continued without interruption: and when once a body, or ſet of bodies, have obtained an eſtabliſhed or fixed name, certainly no writer whatever, to gratify his pride or his fancy, has a right to tranſpoſe it: they only have a right to frame new and correct names, more appoſite and ſcientifical, to define ſuch bodies by; but to tranſpoſe names from one to another very different object, is a wantonneſs can never be juſtified.

The next author in rank is Mr. Davila. This gentleman arranges his Shells on d'Argenville's ſyſtem, though not without making ſome changes in ſubdividing, tranſpoſing, or joining families together, to give his method more order and connexion. I muſt own, that in my opinion, Mr. Davila's ſyſtem will require very little correction.

The laſt ſyſtem I ſhall note is that of Mr. Meuſchen, Envoy from ſeveral German courts to the Hague. Mr. Meuſchen has the three common and general diviſions of Univalves, Bivalves, and Multivalves. As I ſhall have occaſion to note his method more particularly in regard to ſeveral families, I ſhall wave ſaying further of it at preſent.

Of Mr. Martini's method I cannot ſay any thing, as the work is not yet completed.

⁂

SECTION V.

AS the ſeveral ſyſtems of authors are ſet forth, I ſhall gradually proceed on my method or arrangement: however, I will not open the whole at one view, it being my deſign to detail the ſeveral families as I progreſſively treat on them.

But, before I begin, it is abſolutely neceſſary to fix ſome eſſential or ſtandard characters to all Shells; by which they can be divided into families or claſſes, genera and ſpecies. Theſe characters muſt always be formed from the chief parts of the Shells, the differences of which, in ſhape, ſize, ſituation, or other marks or particularities, will enable us to form reſpective families or claſſes, and thoſe families into genera, and afterwards into ſpecies, by other ſubordinate characters. Thus in

Univalves, let me note the five following ſtandard or eſſential characters for the claſſes or families.

Theſe are, 1. Simple or not turbinated. 2. Turbinated, with a ſingle continued cavity. 3. Turbinated and chambered, or with many compartments or cavities. 4. The total ſhape: and, 5. The aperture, mouth, or opening of the Shell.

The ſubordinate characters for genera and ſpecies, I reckon to be only five for Univalves, viz. 1. The number of ſpires, convolutions, rounds, or wreaths. 2. Whether operculated, or covered with a lid, or not operculated. 3. The ſhelly ſubſtance, whether opake, horny, pearly, &c. 4. The Epidermis: and, 5. The head and end or tip.

As theſe characters include the principal parts of all Univalves, they of courſe conſtitute the rudiments of the ſyſtem.

It is only laudable to collect; but when a collector alſo makes it his ſtudy, to contemplate ſcientifically the natural curioſities he acquires, he then adds the reſpect of mankind to the praiſe already gained by his aſſiduity.

As on this view I have preſumed to trouble the learned with this treatiſe, which I ſhall ſtrive to render inſtructive, as well as meerly curious, ſo far as the ſubject of Conchology will permit; I think it further neceſſary to lay down ſome rules to enable even the collectors as well as the ſtudious, to be aiding or aſſiſting to the ſtudy.

Dr. Woodward judiciouſly obſerves *, that aſſuredly, the man who ſhould ſpend his whole life in amaſſing together ſtone, timber, and other materials for building, without ever aiming at the making

---

* Preface to Catalogue of Engliſh foſſils, p. xiii.

an uſe, or raiſing any fabrick out of them, might well be reputed very fantaſtic and extravagant. And a like cenſure would be his due, who ſhould be perpetually heaping up of natural collections, without deſign of building a ſtructure of philoſophy out of them, or advancing ſome propoſitions that might turn to the benefit and advantage of the world. This is in reality the true and only proper end of collections, of obſervations, and natural hiſtory: and they are of no manner of uſe or value without it. Now, as collections are the materials, it behoves every collector to make obſervations, or give what accounts his capacity or leiſure permit him, that others, who ſhall have more ſcience and leiſure to purſue the deſign, may find land-marks and notices ſufficient to conduct themſelves by in that ſo uſeful a purſuit.

Few Conchologiſts have duly attended to this view; and what few curious obſervations have been made, are ſcattered or diſperſed through many and tedious volumes.

My views being to remedy theſe inattentions, as far as lies in my power; I ſhall ſtrive to give ſome inſtructions to obtain ſuch ſcientifical ends.

I have always found each ſeparate collection to contain ſome or many ſpecies not met with in others; and alſo particularities of ſpecies, cauſed either by different growths, accidents, &c. that are inſtructive. A number of ſuch obſervations relative to the ſizes, colours, &c. of one ſpecies, ſelected from different collections, united and collated together, cannot fail to form a conſiderable part of the natural hiſtory of bodies: and ſhould therefore always be attended to, by thoſe that are ſpeculative.

For example, Dr. Liſter ſtiles the Tortoiſe Limpet *ingens*, or of the firſt magnitude; yet we ſeldom ſee them very large in our collections. The Shells are generally of a middle ſize, and Rumphius gives them the contour of a rixdollar, or about an inch acroſs. However, the ſpecimens preſerved in the Britiſh Muſeum confirm Liſter's appellation, and inform us they are to be found from the common ſize of an inch, and an inch and a half acroſs, to above two inches and a half acroſs. Thus, by the collation of united obſervations, we always gain additional knowledge, and therefore ſuch enquiries ſhould be aſſiduouſly purſued.

In order, therefore, to acquire ſuch illuſtrations of natural hiſtory, it will be neceſſary to intreat every collector to keep a meer catalogue, if his will or leiſure does not prompt him to take further trouble, and only enter the kinds, ſizes, and colours of his Shells, whence bought, and other very remarkable particulars. A parcel of ſuch meer notices may be of great uſe to a man of ſcience, who ſhould happen to peruſe them.

This procedure would even make faſhionable collectors, at the coſt of trifling labour to themſelves, uſeful to ſcience.

But for thoſe, whoſe inclination, abilities, and leiſure, prompt them to purſue the ſtudy ſcientifically, the route is to be changed; their catalogues ſhould be very particular, and attended with deſcriptions and obſervations.

As there is a method to be obſerved in every action of life, I will point out the chief heads, under which to form and digeſt the ſaid catalogues and obſervations. Firſt, the family you think it of, of what genus of that family, and of what ſpecies of that genus, or if of a new-diſcovered ſpecies, genus, or family. Secondly, if in its rough or native ſtate, note its appearance; as likewiſe how it appears when poliſhed, &c. Thirdly, its country, if ſcarce or plenty, and the ſoils, or what places of reſort it has; with what other Shells or fiſh it is found; or whatever anſwerable notices you can procure.

A good deſcription and figure muſt follow. The deſcription ſhould include all the obvious or viſible particulars of the ſubject; as ſize, ſhape, colour, and other circumſtances.

It is a very difficult matter to frame a good or accurate deſcription of a body. That depends on the call of ideas, the force of language, and the choice of compariſons. It behoves me not to explain it further here, as it touches on the ſcience of rhetoric and pure writing. The difficulty of making intelligible and good deſcriptions has been the rock on which moſt writers have ſplit.

It is neceſſary to avoid the affected conciſeneſs and quaint terms now ſo much in faſhion, and only to uſe the proper language and eſtabliſhed terms. Linnæus, otherwiſe the great ornament of natural hiſtorians, is very blameable in this reſpect.

To finiſh this ſubject, I ſhall define and name the different parts of Shells, that a proper and diſtinguiſhed name may be applied to each part: a particular yet much wanted. At the preſent I will confine myſelf only to Univalves, leaving the Bivalves and Multivalves to be diſcuſſed hereafter. I am the more deſirous of fixing technical names, as the unjuſtifiable and very indecent terms uſed by Linnæus in his Bivalves may meet their deſerved fate, by being exploded with indignation; for

Immodeſt words admit of no defence,
And want of decency is want of ſenſe.

Theſe my terms being adopted, will render deſcriptions proper, intelligible, and decent; by which the ſcience may become uſeful, eaſy, and adapted to all capacities, and to both ſexes.

The names I propoſe for the chief different parts of Univalves are as follow:

1. The Epidermis, or Perioſteum. This part is common to Bivalves as well as Univalves. It is a rough covering or ſkin, which many but not all Shells have, only on the outſide, never withinſide the Shell. The Epidermis, perhaps, is a perioſte or membrane, that covers the Shells to defend them from exterior accidents, to preſerve them, and aid their growth. In that it does the ſame office as the perioſte or membrane that covers the bones of other animals: for the Shells of theſe fiſh may be conſidered, and indeed are, as analogous to the bones of other animals. There are many ſpecies of Shells conſtantly have the Epidermis; and there are others that never have an epidermis, as the Cowries, Olives, &c.

The Epidermis ſeems as much a genuine covering of the Shell formed by the fiſh itſelf, as the Shell. And, could we ſee the recent fiſh, and examine its organs, I doubt not but we ſhould find the rudiments of a proper apparatus for making the Epidermis as well as the Shell.

The ſtructure of this Epidermis is very different in different genera. In ſome laminated, in ſome fibrous and bruſh-like, &c. It deſerves to be more minutely examined, and it ſeems not improbable but among the ſeveral uſes of this covering the two following may deſerve conſideration.

Firſt, to prevent the ſalt water from corroding the Shell. For all Shells that have the Epidermis have a ſcabrous ſurface.

Secondly, to prevent other Shell-fiſh or marine inſects from fixing their habitations on theſe Shells, as they do upon all bodies in the ſea, where there is not a power of defence.

And this makes me imagine that the fiſh inhabiting all naturally poliſhed Shells whatever, are capable of not only adding to the extent and growth of their Shells; but can likewiſe, from time to time, add a freſh poliſhed covering to the whole Shell; at leaſt their organs extend to ſuch a length as to clear away all impurities from their Shells. We ſeldom find any Cowries with Coral or any extraneous bodies adhering to any part of them.

The head (apex) of an Univalve is the part juſt over the mouth or aperture. The baſe end or tip, (baſin ſeu acumen) that part oppoſite to it, or the end of the turban, though ſome authors have given them quite contrary names, by calling the tip or end the part over the mouth. In ſpeaking of Shells it may be underſtood, that when the upper or under ſide, or ends are mentioned, it is ſuppoſed that the Shell lies on its mouth upon a table, with the head towards the right hand, and the end or tip towards the left.

The body of the Shell (corpus) is that part which runs from the top to the extreme limits of the aperture, and may with propriety be alſo called the firſt whirl. Plate I. Fig. 3, 4, 6, and 7. *a. a. a. a.*

A whirl, turn, ſpire, or wreath (Spira, Anfractus) denotes each ſingle or ſeparate turning or circumvolution. See Plate I. Fig. 3, 4. *b. b.*

The diſpoſition of the ſpires, ſays Mr. Adanſon, p. xxxi. is not the ſame in all Shells: it varies according to the different plans they turn on, and they can turn on four different plans, which are; 1. the Horizontal Plan; 2. the Cylindrick Plan, or ſpread on a cylindar; 3. the Conic Plan; and 4. the Ovoid Plan. From theſe four diſpoſitions of the ſpires, all the different forms or figures of Shells proceed.

Theſe are the four principal diſpoſitions of the ſpires; but there are many intermediate ones, which proceed from different degrees and combinations of theſe four.

The number and forms of the ſpires vary in the ſame ſpecies, either in their different growths or ſexes. Young Shells have always a leſs number than the old ones: the reaſon is plain, as all turbinated or ſpiral Shells take their growth from the tip or end to the mouth, or upwards. Some Shells, though of the ſame age, ſometimes have not the ſame number of ſpires: that is to be attributed to ſickneſs, or rather it is an effect of the ſex. Thus, in the Purpuræ, the Buccina, and in ſome other kinds, it is common for the males to have their ſpires leſs numerous; more ſlender and lengthened, or leſs ſwelled; and the whole Shell ſmaller, than in the females. This obſervation, which I have not neglected to make whenever opportunity offered, I always found to be conſtant.

The Turban or Clavicle (Clavicula) is the aggregate, or whole ſet of the whirls, and always forms the lower part of the Shell. See Pl. I. fig. 3, 4, and 7. *c. c. c.*

A flat or helix turban (clavicula helix) is one ſo ſlightly prominent as to be near on a level, as Pl. V. fig. 7, 9. The ſhort turban (clavicula depreſſa) as Pl. V. fig. 3, 4, 8. The produced turban (clavicula longiore) as Plate I. fig. 3, 4. Pl. III. fig. 12, 13. Pl. V. fig. 1, 2, &c. The long turban (clavicula longiſſima) as Pl. III. fig. 9. Pl. IV. fig. 4 and 7, are explained by the very names or terms.

The Pillar (Columella) is the middle part, or axis, which runs through the Shell its length, or from top to bottom, and from which all the ſpires commence and turn round, and is the ſupport or baſis of them. It always lies aſide the mouth, and though not ſeen in all the Shells, yet in many it is the moſt obvious part of the mouth, after the lip. See Pl. I. fig. 5. *d. d. d.*

The mouth or aperture (apertura) needs no explanation. See Pl. I. fig. 3, 6. *e e.*

A full or round mouth. Plate III. fig. 12. A ſimilunar mouth. Plate III. fig. 14.

The lip (labium) ſimply, is the meer outer contour of the mouth or aperture; but the inner, or columella lip, (labium interius vel columellæ) is the poliſhed or ſmooth part oppoſite to the lip, and is always ſpread on the columella. See Pl. I. fig. 3, 6. *f f. g g.*

The beak (roſtrum) is that prolonged furrowed part, extended ſtreight upwards from the top of the aperture like a horn, more or leſs in the different families. It is by ſome authors called the tongue or bore, eſpecially when ſpoken of the Purpuræ: as it is imagined they bore the Shells of the fiſh they feed on, with it. See Pl. I.

fig. 3, 4, 5, 6, 7. *h h h h h*; alſo Pl. IV. fig. 4 and 5.

The ſcoop (ſinus) is the hollowed or gutter-like proceſs placed ſide-ways of the beak, and lower down on the very lip; which is ſeen in the ſpiders, &c. Such Shells have been called, from theſe two-fold proceſſes, the beak and this, Buccina Bilinguia. See Pl. I. fig. 6, 7. *i i.*

The claws or prongs (digiti, dactyli, unguli vel appendices) are the proceſſes that iſſue from all the contour of the lip, as in the ſpiders. See Pl. I. fig. 6, 7. *k k.*

Umbilicated Shells (Cochleæ Umbilicatæ) are thoſe that have a navel or hollow placed on the firſt or body whirl, or in the center, which penetrates the Shell deeply, or its length. This is moſtly ſeen in Cochleæ, Trochi, and ſome Buccina. See Pl. III. fig. 11. Pl. IV. fig. 6.

Helices (Helices) are thoſe Shells that have their whirls or turnings lying, as it were, between two flats or levels, as ſome river ſnails, poſt-horn ſnails, ammonitæ, and others. See Pl. II. fig. 19, 22. Pl. III. fig. 10.

Revolved Shells (univalvia turbinata, clavicula intus recondita, vel ita in ſe contorta, ut eorum circumvolutiones nulla ex parte promineant) are thoſe that turn or revolve withinſide, or whoſe whirls or turnings are hidden or abſorbed within the body of the Shell, ſo that only the outer whirl is ſeen, and they have no clavicle: ſuch are the Nautili and the Cowries. See Pl. II. fig. 16. Pl. III. fig. 1, 2, 3, 4, 5.

Winged Shells (Alatæ) are thoſe whoſe lips expand greatly outwards, and form large flaps or wings; as the Plough, the Duck's Wing, the Spiders, and many others. See Pl. I. fig. 6, 7, and Pl. V. fig. 1.

Right-handed Shells (heteroſtropha) are ſuch whoſe whirls, or convolutions, turn from right to left, or contrary to the moſt general manner of turbinated Univalves.

Operculated Shells (cochleæ operculatæ) are ſuch as have a looſe piece, which ſhuts up or covers the aperture or mouth of the Shell, like a lid. So that the Shell really conſiſts of two ſeparate and very unequal pieces, viz. one piece flat and ſmall, the other large and ſpiral: the former being the lid, the latter the Shell itſelf. None but turbinated Univalves have opercula or lids.

Theſe opercula, or lids, ſee Pl. I. fig. 10. are ſmall, in compariſon to the Shells: and of different ſubſtances, as ſhelly, leathery, or horny. They are alſo of different forms, as perfectly round, ſimilunar, elliptical, oval, or very lengthened: and they are generally wrought with a ſpiral work, or with concentric circles.

The operculum, or lid, is always fixed on the upper part of the pedeſtal of the fiſh. In ſome at the outer end or extremity, ſo that it retires conſiderably from the Shell when the animal moves or walks. In others it is placed at the inner extremity or root. The operculum exactly covers or cloſes the Shell in thoſe whoſe mouths are round, ſemicircular, or oval, as the Nerits, Pl. III. fig. 14. Turbines, Pl. III, fig. 12. Purpuræ, Pl. IV. fig. 4, and 5, &c.; but in thoſe Shells that have very lengthened or narrow mouths, as the Volutes, Pl. V. fig. 8 and 9, it is not eaſy to conceive what uſe the opercula are of; for they ſeem not to ſhut or cover much above the fifth part of the mouth *.

The

---

* Surely all the Operculæ ſerve as covers, and entirely ſhut up the fiſh; therefore, though they do not ſeem

The above is meant only for Sea Univalves, whoſe opercula are a part of the animal, and is brought forth with it. The operculated Land Univalves are very different; they form a new lid or operculum every year, or oftner; and that is only at ſuch times that the animals want to ſhelter themſelves from the injuries of the weather. It is compoſed of a viſcous ſlabber, from the body of the animal, which condenſes into a kind of toughiſh coriaceous or leather-like ſubſtance, and is pretty thick. This lid or cruſt is never attached to the body of the animal, as in the Sea Univalves, but merely covers the mouth; nor is it ever wrought with a ſpiral or with concentric circles, or indeed any other regular work.

ſeem to fit the outer mouths or apertures of the Shells, yet the fiſh retires within the Shell, ſo far as to make it fit, or cloſe exactly to where he retires.

All ſhell-like opercula are of a calcareous nature, and diſſolve in acids. It is therefore, that when put in vinegar or other acids, they move briſkly to and fro for ſome time, by the ebullition; from which particular, among the common people fond of curioſities, they have obtained the name of *Creeping Stones*. The horny and leathery opercula ſpurn acids. They have a kind of greaſineſs or unctuoſity, which, when they are burnt, exhales a ſtrong ſmell, ſometimes agreeable, but moſt generally very fœtid. The Blatta Byzantia, Conchylium, or Unguis Aromaticus of the antients, and greatly valued, till of late, in the materia medica, was of this latter kind. It was called Unguis, becauſe imagined to reſemble the talons of a bird of prey. Dioſcorides propoſes two kinds; one from the Red Sea, white and greaſy, which was the moſt eſteemed: the other black and not ſo large, which came from Babylon. Of later times they have uſed indifferently the ſmall round opercula of

Purpuræ, &c. by the name of Blatta Byzantia. When burnt they exhale a ſmell ſomewhat like that of Caſtoreum, and their ſmoak was held good for vapours and the epilepſy, and in decoctions they were reckoned laxatives: but at preſent theſe medicines are exploded.

Simple Univalves (Univalvia non turbinata, vel in ſe non contorta) as the Limpet, Pl. I. fig. 1 and 2, the eye or apex. *l.*

Chambered Univalves, (Univalvia Polythalamia) as the Ammonite, &c. Pl. II. fig. 12, 14, 17, 20, and 21.

Revolved Univalves. See p. 118.

Turbinated Univalves, (Univalvia turbinata.) See Pl. I. fig. 3, 4, 6, 7.

SECTION VI.

AS I have now finiſhed the general parts of the ſtudy, I ſhall regularly proceed to my ſyſtem or method of Shells; but, previous to it, muſt make ſome obſervations.

Firſt, I do not think it neceſſary to divide Shells, as Liſter, Gualtieri, Argenville, and others have done, into land, river, and ſea Shells. I really do not find eſſential characters enough between thoſe Shells to poſitively or definitely determine which are which. Some have pretended to eſtabliſh a character between them, from the extreme thinneſs of land and river Shells to ſea Shells; and the want of colour in the land and river Shells. But they are no fixed characters; for numbers of ſea Shells are as thin as river Shells, *e. g.* the Paper Nautili, Partridges, &c. Mr. Davila has on this error placed the ſmall ~~blue~~ rayed, and the cracked Limpets, as river Shells, which are ſea Shells.

In regard to land Snails, many of them are as thick and well coloured as any ſea Shells; therefore this character is alſo very vague and uncertain.

However, one character is very fixed, or a ſtandard in the land operculated Univalves, and is extremely different from the ſea operculated Shells. I took notice of it in my account of the opercula or lids. It is, the opercula, or lids, of all Land Shells, are never wrought with ſpiral lines, are of a tough or leathery ſubſtance, and not ſtoney or cartilaginous; and beſides, they are never attached to, or make any part of the very animal. It is extremely ſeldom that we can elucidate this particular in collections; as Shells and their opercula are rarely ſeen together.

gether, therefore it is from the reſult of obſervations only I aſſert it. However, any land Snail will demonſtrate it; which, if we did not know was a land Snail, we might poſitively affirm to be one from its operculum or lid; for it is leathery, has no concentric or ſpiral lines, and is ſpread over the mouth in ſuch a manner, as even to paſs over the very edges or contour: whereas, on the contrary, a Bloody Tooth, Nerit, or any Buccinum, can be proved to be ſea Shells, by their opercula being ſhelly, by the work on them, and alſo by being cloſed within the lips or edges of the aperture, and not ſpread over them.

These reaſons make me reject, in my ſyſtem, the diviſion of Shells into land, river, and ſea; becauſe, for want of common fixed characters, we never can poſitively aſcertain which are which. I therefore ſhall blend all Shells together without ſuch diſtinctions.

A ſecond obſervation I ſhall make is, that the moſt general ſtructure of teſtaceous animals is to be attached to their Shells, and to be always fixed in them by one or more ligaments or muſcles. This fixation certainly anſwers to reaſon; for theſe creatures can never probably be imagined to form their Shells, and augment them when neceſſary, had not the animal itſelf a fixed and common communication with its Shell, by means of muſcles, to tranſmit the proper juices for the increaſe of it. Yet, however, it is averred, that the fiſh of three families are not always affixed by muſcles to their Shells, and thoſe are the Vermiculi, the Dentalia, and the Paper Nautili.

The Paper Nautilus appears not to be fixed by any one part to its Shell, and is very frequently ſeen without it. The fiſhermen muſt be very nimble to catch the fiſh in its ſhell, they quit their Shells with ſuch eaſe. The Vermiculi and Dentalia are found floating, as it were, in their Shells, no ways fixed, but quite looſe and free, like any thing in a ſheath. However, to reconcile this ſeeming paradox, and perhaps it is the real ſtate of the caſe; it is more reaſonable to advance, that theſe animals are abſolutely looſe from their Shells, but rather that they are only very ſlightly connected to it: and, perhaps, when the Shell is complete or full grown, they detach themſelves from the muſcles. Analogous to what lobſters and other cruſtaceous fiſh do when they caſt their yearly cruſts; that is, they detach the muſcles of the old cruſts, to affix them on their new ones.

There is another obſervation to be made with regard to Vermiculi, viz. that theſe teſtaceous animals border on, or connect ſo cloſe to, all the coral Polypes, that it is impoſſible to fix their diſtinct limits, ſo as to pronounce definitively whether Corals ſhould be ranked as teſtaceous animals, as a late author, Martini, has done in ſome particulars; or, whether the Vermiculi ſhould rather be ranked as Corals, and expunged the Teſtacea. I muſt needs own I waver ſo much in my opinion, as not to be able to determine it at preſent; therefore, ſhall leave it to be ſettled by future naturaliſts. However, I am of the celebrated Linnæus's opinion, to ſeparate them, and make the Vermiculi and Dentalia teſtaceous animals, and the Corals a quite ſeparate or diſtinct order.

Another particular is alſo to be ſettled in regard to the Echini. The Echini are as yet very indefinitely placed by naturaliſts; many ranking them as cruſtaceous, many as teſtaceous, and even many as animals of an order diſtinct from either. Thus Liſter and Adanſon take no notice of them among the Teſtacea. Rumphius and Seba place them with the Sea Stars and Cruſtacea. Linnæus calls them Molluſca, as he does

Sea Stars, &c. and diſtinct from Shells, while, on the other hand, Buonanni and Grew, who rank them with the Teſtacea, place them as Univalves; and Woodward, Argenville, Gualtieri, Breynius, Davila and Meuſchen, all rank them as Multivalves.

I ſhall therefore give my opinion of the rank of theſe animals as follows, viz. that though the Echini, by being a lump of naked fleſh, merely included or lodged in the Shell, brings them to my definition of Teſtacea, and not of Cruſtacea; yet the two orifices in the very ſhell for their food and excrements, their ſpines and progreſſive motion thereby, and their cruſts ſimilar to that of Cruſtacea, approach them ſo near to it, that I am led to reject them from the order of teſtaceous animals: nor can they be properly arranged as cruſtacea. Therefore, I would propoſe to range them in an order by themſelves.

Thoſe recited authors who have ranged them as Shells, place them as Univalves, or as Multivalves. The latter diſpoſition is certainly very erroneous; for, though they define the many ſutures ſeen in Echini as ſo many valves, yet they cannot in anywiſe be reckoned as ſuch, for they have no play or motion whatever, as valves, but are meer joinings of ſeveral pieces, always permanent and fixed. Neither indeed would the name of Multivalves anſwer to all Echini, could the ſutures even be termed valves; as only ſome genera, not all Echini, are compoſed of ſuch ſutures.

As for making them a genus of Molluſca, with the Sea Stars, &c. as Linnæus does, I can in no wiſe approve it; becauſe, certainly, the Sea Stars being coriaceous, and the Echini cruſty, they demand different orders, for they cannot be reckoned genera of the ſame order. It is, therefore,

I think

I think myſelf further juſtified in creating a new order*.

Now to the ſyſtem or method.

I divide all teſtaceous animals into the three uſual general diviſions of Univalves, Bivalves, and Multivalves.

Each of theſe three general diviſions contains many families, genera, and ſpecies.

Mr. Tournefort well obſerves, there ought to be certain principles or characters in

---

* The numerous claſs of Echini moſt certainly are cruſtaceous, are conjoined to the Star fiſh, or at leaſt are *Affines.* They have no common character with the Teſtacea, but their living in the ſea, and partaking of the nature of marine animals. It is not clear, that they do not in certain periods even change their Shells, as crabs and lobſters. How elſe can we account for their increaſe? The form and ſubſtance of theſe Shells render it extremely difficult to account for this, without ſuch a ſuppoſition — they are neither Univalves nor Multivalves. They are a claſs apart, as much as the Aſtaci, &c.

Some of the Sea Stars conſiſt of many cruſtaceous parts; their food, their progreſſion are, ſimilar, and muſt be conjoined. Corio-cruſtacea.

every

every ſyſtem or method; which principles or characters ſhould always be taken from the chief part of the objects, and not from ſeveral parts. This character ſhould alſo be the conſtant one through the whole ſyſtem, to preſerve a perfect regularity. Thus all bodies which agree in one fixed character form the claſs, and the affinities or differences of thoſe bodies to each other in other leſs chief or principal parts, create the ſubordinate genera and ſpecies.

On this maxim I ſhall build my ſyſtem, and for all the turbinated Univalves, I ſhall fix on the aperture or mouth of the Shell as the head or chief character. For the Bivalves on the hinges, and for the Multivalves, on the number of valves.

The ſimple figure, the chambered ſtructure, and the latent whirls of the revolved Shells, which are all the remaining Univalves that are not characteriſed by the mouth, ſuch as the Limpets, Ammonia, and

Cowries, ſhall be the head characters for thoſe families.

In regard to ſecondary or ſubordinate characters for genera or ſpecies, I ſhall note the following: 1. The figure or ſhape. 2. The turban or clavicle. 3. The work on the Shell: and, 4. The other leſs eſſential particularities; as, thickneſs or thinneſs of the Shell, the epidermis, and the ſubſtance, whether pearly, horny, or opake, &c.

* * *

SECTION VII.

THERE is one natural order of univalve Shells, which ought to be adhered to as ſcrupulouſly as poſſible. One ſhould proceed from the ſimpleſt forms to the moſt complex.

The Patellæ undoubtedly ſtand firſt.
The Aures Marinæ.
Cowries.
Olives.
Volutes.
Nerits.
Globoſæ.
Caſſides.
Trochi.
Cochleæ.
Turbines.
Buccina.
Murices.

It will be difficult to fix the limits where one claſs ends, and another begins. But, by keeping cloſe in view the natural proceſſion, it ſeems practicable to form a better ſyſtem than any yet propoſed.

The enumeration of the Univalves is as follows:

Diviſion I. Univalves.

Part I. Simple Univalves, or Univalves not turbinated, or little, if at all, ſpiral. This part contains four families: viz. 1. The Limpets. 2. The Aures Marinæ, which are ſlightly ſpiral. 3. The Vermiculi or Worm Shells; and, 4. The Dentalia.

Family 1. Limpets. Patellæ.

This family derives its Latin name from its reſemblance to a little plate; like this utenſil, the Limpets are for the moſt part round, or oval, or approaching thereto;

the part that contains the fiſh is concave, ſmooth, and often finely waſhed with colours. The Shell is more or leſs conical. The apex, or eye, is either whole or perforated, and is ſeldom placed exactly in the middle of the Shell, but moſt commonly inclines towards one end; that is, taking it in its longeſt dimenſions. The rim of the Shell, which forms its baſe, is likewiſe various, ſometimes without any prominencies or ſmooth, ſometimes with large ones or jagged, and ſometimes with ſlits only, or crenated. Their external ſurface is often rough and ſcabrous, and their apices often imperfect; for, moſt of this family adhering to the rocks, they are much expoſed to the ſun during ebb, and to all the violences that render dead Shells unacceptable to the curious.

Though it commonly happens, that the Shells moſt remarkable for the brilliancy of their colours are of the ſimpleſt form, as the Nerits, Olives, Volutes, &c. yet this tribe ſeems an exception. It is true there are conſiderable numbers that have very lively colours; yet, in general, they abound with leſs variety than moſt other Shells. In ſome parts of England the Limpets have obtained the name of *Nipple Shells*.

The Limpets from particular characters may be divided into three genera, viz.

1. Whole or entire Limpets (Patellæ vertice integro), or that are not perforated or open at top.

2. Chambered Limpets (Patellæ concamerata ſive cavitate Stylo interno donata.)

3. Pierced or perforated Limpets, Maſks, (Patellæ vertice perforato) or thoſe that have their tops perforated with a hole pierced quite through the Shell.

Some authors have made a fourth genus of Limpets, with a twirled, crooked, or produced beak. (Vertice adunco.) But as ſeveral Limpets run much on it, though not properly twirled or produced, when their beaks are pointed and ſituated ſideways*, I cannot think it a character ſufficient or ſtrong enough to form a genus.

I have already obſerved, that in the vaſt volume of Seba, it is very remarkable, not a ſingle Limpet is figured, deſcribed, or even mentioned.

The Limpets, though not ſeemingly ſo, are a numerous family. I have recognized about ſeventy ſpecies.

The firſt genus, or whole Limpets, is very numerous. The ſecond, or Chambered Limpets, has many ſpecies : but the third genus, or perforated Limpets, or Maſks, has but few ſpecies. The enumeration of all the ſpecies appertains more properly to a hiſtory of Shells, than to theſe rudiments.

---

* Concho-lepas, Cochlea-lepas, &c.

Europe affords few ſpecies. The fineſt and largeſt are from the Eaſt-Indies. Africa, eſpecially the Cape of Good Hope, produces many fine ones. America has many of the chambered and ſmaller kinds: and late diſcoveries have brought us ſome large and fine Limpets from the Streights of Magellan and the South Sea.

Plate I. fig. 1, 2, repreſents the common Engliſh Limpet in two views.

Plate II. fig. 1. The Goat's Eye Limpet. Oeil de bouc, Argenville, p. 188. Plate II. B. Gualtieri. Tab. 9. H. A Mediterranean Shell.

Plate II. fig. 2. A Chambered Limpet from America in two views.

Plate II. fig. 3. The Magellanic Maſk Limpet.

Theſe are the neceſſary notices that occur to me relative to the recent Limpets, or thoſe known from ſea. But, as appendixes to the ſeveral families of recent Shells, I ſhall enumerate ſome foſſil Shells which are not yet, to my knowledge, diſcovered or known recent or living, in order to form a more complete ſyſtem of teſtaceous animals than has hitherto been done: by interpolating the unknown foſſil Shells with the recent ones. For not only ſingle ſpecies of foſſil Shells yet remain undiſcovered in their recent or living ſtate; but genera, and even whole families, as the Ammonia, Anomiæ, &c. by which means I add thoſe Deſiderata which we are ſure ſtill exiſt in the ſeas, though not yet known to us otherwiſe than in the foſſil ſtate.

Foſſil Limpets are very rarely met with; however, there are two kinds which ſeem to challenge a place in this appendix, viz.

A ſmall ſpecies of Fools Cap. It ſeems different from the Weſt Indian kind, but approaches it nearly. This is not unfrequently found in the calcareous ſoils of France.

The ſecond is a very curious and remarkable kind, and the fragments of it, called by foſſilogiſts Trichites, are found in great abundance in the Engliſh chalk-pits*, yet the Shells are ſo exceſſive rare to be met with entire, or even nearly ſo, that I have never ſeen but four, which are all in the elegant collection of my eſteemed friend Mr. Ingham Foſter, of London, who found them in the chalk-cliffs near Dover.

Theſe Limpets are very large, and, like the Concho Lepas, reſemble a ſingle Shell of a Bivalve. They ſeem to be of two kinds, and are more irregular than that Shell, and, inſtead of being ſulcated lengthwiſe, are circularly wrought, or in a tranſverſe manner, with very high irregular ridges, not thickly, but rather thinly ſet. The Shells are very thick. One ſort is high, or copped, the other is broad or flattiſh. The inſide is quite ſmooth, the edges turn outwards, and, under the beak, or that part which anſwers to the hinge in Bivalves, they ſtretch out (all towards the ſame ſide) into a broad flat ledge, the perpendicular ſide of which, is curiouſly worked with ſtreight and parallel furrows, like to the hinge of a Multarticulate Bivalve. On the very top or beak part, it has a large, wide, roundiſh opening, like a fracture, which, from its remarkable thinneſs, makes it difficult to determine, whether it be a natural perforation or an accidental fracture, though, by its regular edge, and being quite alike in all the four ſpecimens, one would incline in favour of the former.

---

* *Trichites Cretaceorum, Lhwydii, Lith. Brit. Ichnogr.* Nos 1751 & 1752.

Family 2. Haliotis*, Aures Marinæ, Sea Ears. The definition of this family is as follows: Shells of an ear-like form, flattiſh, almoſt wide open, or hollow, for, from the apex or head, all along one ſide, it has only a broad ledge or margin. The apex has alſo a ſingle perfect whirl, and a curved row of holes, or perforations, runs its length, from the head to the oppoſite end.

Theſe Shells, in appearance and nature, approach ſo extremely to the Limpets, for they alſo fix themſelves to rocks, that I think they juſtly demand the next place or link in the method.

---

* Haliotis. Liſter could have had no doubts about this family being next in order to the Limpets, had he obſerved, the natural method, i. e. ſimplicity of figure. It is true this Shell has a whirl (rather than a ſpire); but in ſome ſpecies it ſcarcely projects. One ſees, in many of the Nerits, very evident tokens of more circumgyrations.

However, they cannot be properly called ſimple, or Shells that are noways ſpiral; becauſe at their head they have as perfect and fine a whirl as any other turbinated Shell: but, as Nature in her works has made ſuch ſlight tranſitions from one family to another, it is impoſſible to fix them by human definitions. Thus ſeveral of the Chambered Limpets have ſuch ſingle whirls, and the Trocho Lepas and Cochlea Lepas are even ſo greatly ſpiral, as exteriorly to reſemble a Trochus or a Snail; yet are they true Limpets. It is therefore impoſſible to regulate natural objects to a perfect preciſion, by the moſt elaborate and minute definitions.

This ſpiral head of the Haliotis has made ſome authors not only ſeparate them from the Limpets, but alſo even reject them from the ſimple Shells. Thus Liſter * places them in his Hiſtoria Con-

---

* See the note which is printed in p. 144.

chyliorum among the turbinated Shells, after the Nautili, the Snails, and the Nerits, and preceding the Trochi. He does the ſame in his work de Animalibus Angliæ, wherein, p. 167, he ſays, it is ſpiral at the Clavicle in the ſame manner as other turbinated Shells, and therefore by ſome is wrongly placed among the ſimple Shells. Gualtieri ranks them among the Snails with depreſſed or flatted clavicles; and Adanſon and Meuſchen take them from the ſimple Shells, and place them as the firſt family of the ſpiral Shells.

I ſhall fix another character to this family, in which all other authors, Linnæus excepted, differ from me: that is, I can allow no Shell to be of the Haliotis family without having the row of perforations; for I hold that to be an eſſential character. Thus the Venus Ear, ranked as a Haliotis, I ſhall, like Linnæus*, ſeparate from them.

---

* Syſt. Nat. p. 1250, 713, Helix Haliotoidea.

There is yet another character, which ſeems to belong to this family; that is, their inſide is always of the fineſt or moſt orient pearl; and even pearls are often bred in them. This is alſo another reaſon why I do not allow the abovesaid Venus Ear to be of the family, for it wants the pearly inſide, as well as the perforations.

In the row of holes, or perforations, there are generally ſix or ſeven quite perforated, or very open; the reſt are cloſed, and appear rather like tubercles than holes; for it is ſaid the fiſh always cloſes one towards the head, and opens another towards the end, as he grows bigger, and by theſe holes he flings his excrements forth from his Shell.

There are very few ſpecies of this family. It is even doubted, whether ſome ſpecies propoſed by authors, are not rather varieties: but they are found in great abundance in moſt parts of the world.

I never knew a ſingle inſtance of a Haliotis being found foſſil. Pl. II. fig. 4, repreſents a Haliotis or Sea Ear.

The third family is the Vermiculi, or Worm Shells. The definition of this family is, tubular cylindrical Shells, ſingle, in maſſes together, or adherent to other Shells or bodies. Variouſly ſinuous, by winding or twiſting to and fro in a very irregular manner. The Vermiculi in general are of no determinate or fixed regular ſhape, from their windings and twiſtings. But as there are ſome ſpecies which either wholly, or in particular parts, have a regular form; and others which have a kind of concamerated ſtructure; and in that only differ from the generality of them, as the Watring-pot, and the Chambered Worms; I ſhall conſtitute a particular genus for them. Thus the Vermiculi will range under two genera, viz.

1. Vermiculi, or tubular Worm Shells, which have no fixed or regular form, as the common Vermiculi.

2. Penecilli, or thoſe other Worm Shells which in the whole or any eſpecial or particular part, have a determinate regular ſhape or ſtructure.

I have already hinted the near approach of theſe Shells and their animals to corals; but that I ſhould keep them ſeparate, and as teſtacea. However, I ſhall reject all the Sea Worms which inhabit tubes made up of grains of ſand and other ſubſtances, connected or joined together by a glutinous matter; for they are not a ſtructure of a ſolid teſtaceous ſubſtance, and therefore cannot be reckoned as Teſtacea: ſuch as the Sabellæ Linnæi *.

---

* Syſt. Nat. 1268. 335.

The firſt genus of Vermiculi, though found every where in great abundance, are not of many different ſpecies.

Vermiculi, in their various windings, are ſometimes ſo regularly ſpiral, as to emulate the moſt perfect turbinated Shells; but that is only accidental. Pl. II. fig. 6. a groupe of ſmall Vermiculi Shells, and a ſingle large one ſomewhat ſpiral.

The ſecond genus, which I call Penecilli, are Worm Shells, of a regular determinate figure in the whole, or ſome particular part, or elſe of a particular ſtructure.

There are few ſpecies of this genus. The Watering-pot, Pl. II. fig. 8.* from the Eaſt Indies, is the chief kind, and, when perfect, is much valued.

---

* Serpula Penis, Linnæi Syſt. Nat. p. 1267. 806.

Gualtieri ranks the famous Shell the Wentletrap, or Stair-caſe*, with Vermiculi: he gives for reaſon, that the ſpires of this Shell are meer looſe ones, not produced from, or any-ways connected or ſupported by, a pillar or columella, running through the middle of the Shell, its length, as is the conſtant and true ſtructure of all turbinated Shells. If ſo, they certainly are not Buccina, as moſt authors rank them, but Vermiculi. Davila alſo places it among his Vermiculares, without giving any reaſon for ſo doing.

There are alſo Vermiculi, which have concamerations, or are divided into chambers by a few or many tranſverſe plates, Pl. II. fig. 5 †, but they are ſeldom regular, or ſet at equidiſtant intervals, and are not pierced by a pipe or ſiphunculus, that communicates from chamber to chamber, ſo as to permit the fiſh to penetrate more than one chamber or incloſure at a time, in which particulars they eſſentially differ from the concamerated Shells, as the Nautili, &c. Beſides, theſe concamerations do not ſeem conſtant to any particular ſpecies, and appear rather the cloſing up, and deſerting the old place of habitation of the fiſh, when it augments its Shell; like as the very bottom ſpires of a turbinated Shell, which the animal fills up as it grows bigger, and enlarges its habitations. The Solen Arenarius of Rumphius, Tab. 41. fig. E; and thoſe of Davila, Tab. 21; which latter author claſſes them among his multivalves, are of this kind.

---

* Turbo Scalaris, Linnæi Syſt. Nat. p. 1237. 630.

† Serpula Polythalamia, Linn. p. 1266. 802.

The Vermiculi are frequently found in the foſſil ſtate; but I do not recollect any ſpecies, but what is known recent, or from Sea.

The laſt and fourth family of ſimple Shells, or not ſpiral, is the Dentalia. The definition of this family is, Simple tubular Shells, of a regular, determinate, curved, conical ſhape, and open at both ends.

This family has very few ſpecies: and the foſſil ones afford not any kinds yet undiſcovered recent. Pl. II. fig. 9, the large green furrowed Dentale of the Eaſt-Indies. Pl. II. fig. 10, the ſmooth yellowiſh Dentale of the Engliſh ſea.

SECTION VIII.

DIVISION 1, Univalves, part 2, concamerated or chambered Univalves, that have many regular and near equidiſtant cells or chambers, and a pipe or ſiphunculus, that opens into, and communicates from chamber to chamber.

This chambered ſtructure, I fix as the eſſential and ſpecific character of the Shells of this ſecond part of the firſt diviſion; for there occur among them not only revolved and turbinated Shells, but even quite ſimple or no-wiſe turbinated ones.

This ſecond part contains ſix genera, one genus whereof, viz. the Orthoceratites, is of a ſimple figure; four genera, as the Lituitæ, or Croziers, Polythalami, Turbines Ammonia and Ammonoides, are all turbinated; and the other genus, or Nautilus, is revolved.

For the arrangement of theſe chambered Shells, we muſt have recourſe to the foſſil kingdom; ſince there are only two genera of the ſix, viz. the Lituites and Nautilus, that are known recent or from ſea. Conſequently the foſſil kingdom alone helps us to arrange four whole genera, and many ſpecies of the two other genera in the ſyſtem of Shells, all which yet remain undiſcovered living or recent from ſea.

In my twenty-fifth lecture, on foſſils, I have treated this ſubject fully; and have obſerved how ſurprizing it is, that theſe genera, which are found foſſil in ſuch amazing abundance, all over the globe, and beſides are numerous families, have to this hour eſcaped the reſearches of mankind, to diſcover them recent or living. Beſides other arguments given, their being Pelagian Shells, or Shells that inhabit the very deepeſt receſſes of the ſea, ſeems one principal cauſe; as thoſe deep receſſes are not ſubject to the agitations of the great tempeſts and other violent ragings of that immenſe maſs of waters; and therefore the Shells conſtantly remain undiſturbed in them.

Genus 1. Orthoceros, ſimple ſtreight conical Shells, or no-wiſe turbinated; and gradually tapering from a broad end to a ſharp-pointed top, like a ſtrait horn, whence their name. They are chambered from bottom to top, and have a ſiphunculus, or pipe of communication, from chamber to chamber. Pl. II. fig. 12. is greatly magnified, fig. 13. being the natural ſize of the Shell diſcovered, — taken from Gualtieri.

Pl. II. fig. 14, is a fragment of a foſſil, orthoceratites, in a ſmall ſcale, taken from Breynius de polythalamiis; *a a a a*, the cells or chambers; *b b b b*, the ſiphunculus, or pipe of communication, which in both theſe figures is central.

Plancus in his book de Conchis minus notis littoris Ariminenſis, deſcribes ſome recent minute kinds of this genus, which he found in great quantities in the ſea ſediment, at Rimini in Italy. The Orthoceroſes he diſcovered were ſpecies ſo very minute, leſs than one quarter of an inch, and not thicker than a pin, that they demanded the aid of the microſcope, to diſcern their ſtructure. Gualtieri, Tab. 19, has figured four kinds of them, ſent him by Plancus; and Linnæus ranks them in his ſyſtem, as Nautili *.

How different theſe are from thoſe found foſſil, is extremely ſtriking; the recent ſpecies are ſo very minute, as to demand the microſcope to view them; the foſſil ones, on the contrary, are moſtly very large, frequently above a foot in length, and above an inch and a half over, even the ſmalleſt kinds; as the Alveoli are ſeldom leſs than an

---

* Nautilus Orthocera, Linnæi, Syſt. Nat. p. 1164.289.

inch long, and a quarter of an inch over: and beſides their great difference in ſize, they no wiſe tally in other particulars with the larger, ſo as to be imagined young ones of the ſame ſpecies.

Breynius, who firſt formed this genus in his work de Polythalamiis, propoſes nine kinds; and I have obſerved ſome others not mentioned by him.

I would divide this genus into two ſections, viz. 1ſt. thoſe that have the ſiphunculus placed on or near the edge; and 2dly, thoſe that have it central, or near the center.

It is proper to obſerve, that theſe foſſils are always caſts of ſtone or replacements of ſparry matter. I have however ſeen, though extreme rarely, ſlight fragments of the ſhell on them, which fragments were whitiſh and very thin.

Genus 2. Lituus, the crozier. This Shell exactly reſembles a Biſhop's crozier in ſhape, for it has a long cylindrick ſtem, one end whereof turns in a ſpiral manner; but the ſpires are few, ſeparated, and recede from each other.

Breynius, who firſt formed this genus, in his above quoted work, deſcribes and figures a ſingle ſpecies, ſo that it is an extremely rare foſſil. But there is a ſpecies of ſmall recent Shell, commonly called the *rams horn**, found in great abundance, both in the Eaſt and Weſt Indies, which is ranked by moſt authors as a nautilus or ammonis, that certainly is the very identical ſpecies with the foſſil kind. We only ſee the ſpiral end of this recent ſpecies in our collections, and never with its ſtem. However, the view alone of it evinces its analogy; for as the ſpires are few, and greatly recede from each other, it muſt follow that the outer ſpire will at laſt inſenſibly fall into a ſtrait line or a ſtem: and the reaſon we never find it with the ſtem, probably, is owing to the thinneſs and brittleneſs of the Shell; ſo that the agitation of the waves, for it is only found caſt up on the ſhores, eaſily breaks off this ſtem or cylindric part. Pl. II. fig. 18. is the entire Shell and fig. 19. is cut open, to ſhew its chambered ſtructure.

---

* Nautilus exiguus, albus, pellucidus, teres, Liſt. Hiſt. Conch. lib. 4. Sect. 401. fig. 2. Nautilus Spirula Linnæi Syſt. Nat. p. 1163. 279.

Genus 3. Turbo Polythalamus ſive Concameratus. I am the firſt who has propoſed this Genus. It is only found foſſil; and even in that ſtate but one ſpecies is known to me. It is a turbinated or ſpiral Shell, of a produced or lengthened ſhape, exactly like a Buccinum in appearance, but is concamerated or chambered, and the diaphragms or partitions are cut and jagged, like to the foliaceous ſutures of the Ammonia.

Caſts of ſtone of this kind, for I have never ſeen it in the Shell ſtate, are found in Dorſetſhire, France, and Switzerland, but never in any great degree of perfection.

Pl. II. fig. 11, is a Turbo Polythalamus, but by the miſtake of the engraver, the figure is laid flat; whereas it ſhould have been erect, in the ſame manner as a Whelk, or other turbinated Shell.

Genus 4. Cornua Ammonis, or Ammonia. The Shells of this genus are perfect Helices, the ſpires lying between two flats or levels. Pl. II. fig. 20, is an Ammonis, and fig. 21, is cut or opened, to ſhew its ſeveral cells or chambers.

The ſpires are cylindric, and connected to each other. They gradually diminiſh or taper (on both levels equally alike) from the circumference to the center; ſo that by the gradual tapering of the ſpires to the center, the centers of both flats are concaves.

The inner ſtructure is chambered; but the diaphragms, or partitions of the cells or chambers, are not roundiſh and with an even edge, as thoſe of the Orthoceros and Nautilus, but are ſlaſhed, or jagged, into proceſſes or appendages, which laid together tally and cloſe into one another ſo ſtrongly and curiouſly, that, when joined, the flats or ſurfaces of the whole Ammonis are embelliſhed with a beautiful leaved work, exactly ſimilar to that on the ſculls of animals: and this by foſſilogiſts is called the foliaceous ſutures of the Ammonites.

However, this foliaceous work does not ſeem to be a particular character of the Ammonia, for the Turbines Concamerati, or preceding Genus, have it; and I have likewiſe ſeen ſpecies of Orthoceratitæ and foſſil Nautili with the ſame work.

The ſiphunculus, or pipe of communication from chamber to chamber in the Ammonia, ſeems to be placed on the back of the ſpires, and not near the edges or in the center of them; but, as I can only draw this concluſion from foſſil ones, which are very rarely ſo perfect as to ſhew the pipe diſtinctly, we muſt yet remain uncertain in regard to this and ſome others of their particular characters.

It is a matter of aſtoniſhment in this and other families of teſtacea, that in general the moſt common foſſil Shells are the ſcarceſt in the recent ſtate, and *vice verſa.* It could be readily explained, were all the foſſil kinds, not known recent, reckoned Pelagian Shells, as the Ammonia certainly are: but then what reaſon can be given for the Limpets, Sea Ears, Volutes, Cowries, &c. which, though in extreme plenty recent, are very rarely found foſſil, with many other ſuch parallel inſtances.

The foſſil Ammonia, or Ammonitæ, are found in great abundance, and of many ſpecies, in moſt parts of the world; from the ſmall ſize of a pea, through all the gradations of ſizes, to above a yard in diameter, and proportionably thick. Theſe are not objects that eſcape the eye by their minuteneſs; yet, nevertheleſs, all the ſpecies of them ſtill remain to be diſcovered, except one very minute kind.

This diſcovered living ſpecies of Ammonis is ſo very minute, as hardly to exceed the bigneſs of a turnep ſeed, and does not weigh the hundredth part of a grain; therefore demands the aid of the microſcope to view it. It was found by Plancus with the recent Orthoceroses abovementioned in the ſea ſediment at Rimini: he has deſcribed and figured it in his work. Gualtieri has alſo figured it as magnified by the microſcope in Tab. 19. fig. H. I. and Linnæus ranks it among the Nautili.

It is very remarkable, that this recent ſpecies is a diſtinct kind from any of the foſſil ones known. It not only differs in particular circumſtances, but even in an eſſential character; which is, that as all the foſſil ones, or Ammonitæ, have a concave center, this recent kind has a very prominent or projecting one.

By what general obſervations I have made on the Ammonitæ, I think the ſpecific character for their ſections, or arrangements, is to be taken from the work on the back of their ſpires; for it is the moſt obvious, conſtant, regular, and certain character.

On this character I ſhall divide the Ammonia into eight ſections or arrangements.

I have given a full account of the ſections, and the ſpecies that rank under them, in my twenty-fifth lecture on foſſils; which I ſhall here briefly recapitulate.

Section I. Ammonia, whoſe backs are quite ſmooth and plain: Ammonia dorſo lævi.

Section II. Ammonia, whoſe backs are ſtriated, ſulcated, or ribbed: Ammonia dorſo ſtriato, ſulcato, vel coſtato.

Section III. Ammonia that have a plain prominent ridge along the back: Ammonia limbo prominulo per totum dorſum ducto.

Section IV. Ammonia with a plain prominent ridge between two furrows: Ammonia limbo prominulo inter duo sſulcos erecto.

Section V. Ammonia with a prominent ridge, not plain as in Section III. but wreathed or twiſted like a rope: Ammonia limbo tæniolato.

Section VI. Ammonia with a plain furrow or channel along the back: Ammonia ſulco unico per dorſum ducto.

Section VII. Ammonia whoſe backs are ſtudded or ſpiked: Ammonia dorſo tuberculato vel aculeato.

Section VIII. Ammonia whoſe backs are deeply notched or toothed like a ſaw: Ammonia dorſo dentato.

Genus 5. Ammonoides. The definition of this genus is, that, in all other reſpects except ſhape, it reſembles the Ammonitæ; for theſe bodies are quite globoſe like Nautili, and not flat like Ammonitæ. The outer ſpire alone makes above one half of the body; and all the other ſpires are very ſmall, and taper into a concavity, ſo that the center is deeply hollowed or umbilicated. Pl. II. fig. 15, an Ammonoides. Theſe elegant foſſils are found at Draycot in Wiltſhire, and in Switzerland.

Genus 6. Nautilus. The Nautili I define to be revolved Shells, or ſuch whoſe ſpires never appear externally, but lie latent or quite hidden within the body of the Shell. Turbinata, volutæ apice non eminente: vel clavicula intus recondita.

The Nautili are of a chambered ſtructure; the partitions of the cells or chambers being concavo-convex roundiſh plates. However, I have ſeen foſſil kinds with foliaceous ſutures like the Ammonitæ; which implies, that all the ſpecies have not ſuch regular roundiſh partitions: and, indeed, Breynius ſolely, on this account, divides the Nautili into two orders, of thoſe with concavo-convex ſemilunar diaphragms, and thoſe with jagged or ſinuated diaphragms. Pl. II.

Pl. II. fig. 16. the Indian pearly Nautilus. Fig. 17. the ſame Shell laid open, to ſhew its cells or chambers, and its ſiphunculus or pipe of communication.

The Paper Nautilus, though claſſed by moſt authors as a Nautilus, is of a diſtinct genus: it not being of a chambered ſtructure.

The ſpecies of Nautili are few. Authors make two ſorts of the Eaſt Indian or pearly kind, to wit, the umbilicated and non-umbilicated; which I aſſent to.

This pearly Nautilus is by ſeveral authors very erroneouſly called Nautilus Græcorum: whereas the Nautilus of the Greeks was the Paper Nautilus, not this kind.

The animal of this Shell is ſaid to inhabit only the uppermoſt or open chamber, which is greatly larger than the others. The reſt remain empty, except that the pipe, or ſiphunculus, which communicates from chamber to chamber, is filled with an appendage or tail of the animal*, like a gut or ſtring †.

Mr. Hooke (Philoſophical Experiments and Obſervations, p.306.) imagines the animal uſes this tail or gut, which fills the pipe or ſiphunculus at will, as its neceſſities require, to exhauſt the water or air from the chambers, or *vice verſa*, to fill them with either; by which actions he renders himſelf of more or leſs ſpecific gravity, to ſink or ſwim.

---

* See the Gentleman's Magazine many years ago on this ſubject. The ſiphunculus is a dilatable tube under the command of the animal. When it is dilated, like the ſwimming-bladder of a fiſh, it renders the the Nautilus buoyant. When it is contracted, the fiſh and ſhell ſink, and juſt to ſuch a degree as the preſent occaſions of the animal require. I believe no water ever enters this tube.

† I have my doubts whether the Nautilus fiſh inhabits more than one chamber of his Shell. I think it does not; for if it does, how is the fiſh ever got from thoſe chambers, as the ſiphunculus is ſo ſmall?

Theſe opinions however are merely ſpeculative, for I cannot find we have acquired an accurate hiſtory of the animal, or its way of life. Rumphius indeed gives a figure and deſcription of the fiſh; but I am of Breynius's opinion, that it is ſo confuſed and unintelligible, as not any information can be gathered from it.

Plancus deſcribes and figures ſome very minute recent Nautili from the ſea ſediment at Rimini. Gualtieri refigures three ſpecies of them, Tab. 19, A. B. C. They are ſo minute that three and thirty of them hardly equal a grain in weight. Linnæus has entered them among his Nautili.

I have ſeen two remarkable foſſil kinds yet undiſcovered, living or recent from the ſea, viz.

A Nautilites about the ſize of a pippin, quite pyritical, without the ſlighteſt veſtiges of the natural Shell. It is deeply umbilicated, has fine foliaceous ſutures in ſeveral parts, and beſides is thickly and finely ridged acroſs from ſide to ſide, the ridges not ſtrait, but curved, the curvature tending downwards, or from the mouth. This is in the elegant collection of my eſteemed friend Mr. Ingham Foſter, of London.

A ſmall kind, with undulated or zigzag ſutures, found in the limeſtone of Derbyſhire and in Germany.

SECTION IX.

PART III, revolved Shells, or Shells whoſe ſpires are latent, or hidden within the body, and do not in any manner appear externally; ſo that they have no clavicle or turban *.

The common Nautilus is alſo a revolved Shell, but being more remarkable for its chambered ſtructure, it is arranged in Part ſecond.

This third part contains three families, to wit, family ſixth, Nuces ſeu Bullæ, the Pewit's Eggs, or Dipping Snails. Seventh, Semiporcellanæ. Eighth, Cypreæ ſeu Porcellanæ, the Cowries.

The ſixth family is the Nuces, ſeu Bullæ, commonly called the Pewit's Eggs, or Dipping Snails, but which I ſhall hence-

---

* Univalvia turbinata, clavicula intus recondita, vel ita in ſe contorta, ut eorum circumvolutiones nulla ex parte promineant. Turbinata involuta.

forward call Dippers, or Sea Nuts. The definition of this family I make as follows; moſt generally of an oval ſhape, and umbilicated at bottom. The mouth very patulous, eſpecially at the top, for it narrows greatly downwards. The lip thin, ſharp, and naked, or without any border or other work; and with a ſmall facing or columella lip on the upper part of the mouth. Pl. III. fig. 4, 5, a Nux, or Dipper, ſhewn on both ſides.

The arrangement of this family is much confuſed in authors, by their ſeeming connexion with the two following families of Semiporcellanæ and Cypreæ. Liſter makes them a genus of Cowry, and calls it Concha Veneris baſi umbilicat.â Grew and Buonanni place it with the Snails. Rumphius, with his Cochleæ Globoſæ; Argenville, Davila, and Meuſchen do the ſame; and, indeed, Linnæus's genus of Bulla is of the ſame complexion; for it alſo includes the figs, turneps, &c. equally with the Dippers. Gualtieri makes it a genus preceding the Cowries, and following the Paper Nautili.

The arrangement that Rumphius, Argenville, Linnæus, Davila, and Meuſchen, give them as Cochleæ Globoſæ, or Tuns, is very ſurprizing and extremely erroneous: ſince they have a very different eſſential character, though all have patulous or very large mouths. For the Nuces, or Bullæ, like the Cowries, have no clavicle or turban; becauſe their ſpires are latent within their bodies: whereas the Conchæ Globoſæ, as the Partridges, Tuns, &c. are really turbinated Shells, and have a very fair and ſtrong external clavicle, but it is generally flattiſh, or not much produced.

Though there is a vaſt difference of colouring in the Dippers, I am, nevertheleſs, inclined to think they are only varieties, and that this family is not numerous.

The ſeventh family is the Semiporcellanæ, or Shells greatly reſembling the Cypreæ or Cowries in their appearance. Their aperture, however, is not ſo narrow, but more open, neither are the lips toothed or dentated; which are the differential characters I eſtabliſh between the two families.

I have already obſerved, that Grew, Rumphius, Seba, Argenville, Gualtieri, and others, have ranked them as Cowries. Liſter calls them Concha Veneris aperturâ non dentatâ. Linnæus makes a genus of them he calls Bulla; in which he alſo includes my preceding family of Nuces or Dippers. Davila, refining on Argenville, divides the Cowries into two genera, of toothed and not toothed; which latter is this kind; and Meuſchen, in like manner, makes them a diviſion of Cowries by the name of Semiporcellanæ.

The ſpecies of this family are not numerous; but among them the Weaver's Shuttle, Pl. III. fig. 3, the Poached Egg, and ſome others, are eſteemed rare and curious Shells.

The eighth family: Cyprea vel Porcellana, the Cowry, Shells generally ſemioval, whoſe flat part is the mouth. The ſpires of the Cowries in no wiſe appear externally, but make their revolutions quite latent, or within the body of the Shell. The aperture is on the flat ſide; it is a narrow opening, or ſent, the length of the Shell. The lips near together, broad, turning inwards, and toothed; the two ends or extremes on the upper part are very bumped and prominent. At one extreme it has a wry gutter, or opening, like the mouth of a ſoal or other flat fiſh; the other extreme has alſo a gutter, but it is ſtrait or perpendicular; and aſide of it, in ſome kinds, there is another protuberance like a ſmall rude clavicle or turban.

The particular character of this family I make to be the deep toothing on the inner edges of the lips, which diſtinguiſhes it from the foregoing family of Semiporcellanæ. Linnæus has kept to this character; but Grew, Liſter, Argenville, Gualtieri, and others, not regarding it, have confounded them all together.

The Cowries are extremely numerous, and moſt of the ſpecies very beautiful in colour and poliſh. They have this elegant poliſh even from the ſea, naturally, or without the aid of art; and were they not common Shells, would perhaps be as highly valued as the Volutes or any others.

It is of no importance to enumerate any of the kinds. I ſhall only remark, that they ſeem to be litoral Shells, and chiefly to inhabit the ſeas round iſlands; for the greateſt number of them are found at the Moluccas, the Maldives, Madagaſcar, the Weſt India iſlands, &c.

Though the Cowries are found in immenſe abundance in the recent or living ſtate, they are very rarely found foſſil; and as they loſe their colours when in the foſſil ſtate, it is impoſſible to determine whether any of them are Species yet undiſcovered recent. However, the kinds found foſſil near Turin, and in France, ſeem to be well known in the recent ſtate. Pl. III. fig. 1, 2, a Cowry, or Cyprea, ſhewn on both ſides.

SECTION X.

PART IV. turbinated or ſpiral Univalves.

The turbinated Shells, properly ſo called, are thoſe Shells whoſe ſpires are external, and ſhew themſelves on the outer part of the Shell in what is called the clavicle or turban (clavicula) which is either produced ſhort or flat, according to the ſeveral genera or ſpecies.

It is this fourth part, or turbinated Univalves, which is the moſt difficult to arrange, and in which authors, in their different ſyſtems, have diſplayed their different opinions. No wonder! ſince it not only contains myriads of ſpecies more than all the other three parts put together; but beſides, the characters of them are fraught with innumerable difficulties not eaſy to ſurmount.

The ſeveral authors have formed their methods from one ſingle, or from a combination of characters; but I reject all the ſyſtems hitherto broached: and, as I obſerved, there ſhould always be one head character, deduced from the principal or chief part of the object, which character ſhould run through the whole ſyſtem, to preſerve a perfect regularity; I have fixed on the aperture or mouth of the Shell, for this head character of my ſyſtem or arrangement of turbinated Univalves. The aperture or mouth will therefore be the touchſtone of my families; and the ſhapes, clavicles, colours, and works of the Shells, I ſhall uſe only as ſubordinate characters.

Having thus fixed the head or eſſential character, I ſhall begin with thoſe Shells that are the moſt ſimple, or leaſt turbinated, and very patulous, or almoſt wide open;

open; therefore the firſt ſet, which conſtitutes the ninth family, is the Cymbium, or Paper Nautilus. Plate III. fig. 6.

This family, it is true, has no external ſpires, nor indeed is it, ſtrictly ſpeaking, a turbinated Shell, except at the very head, which turns in one ſpire only; but, the Shell being quite open, this ſpire is expoſed to view; for it is evident, if the Shell was not open, or vaſcular, but, on the contrary, was cloſed or ſhut up, it would come under Part III. of Revolved Univalves: as the ſpires like in the common or pearly Nautilus would be hidden, or turn within the body of the Shell. However, though ſo unlike the Nautili in not being chambered, yet, in form and other particulars, it much agrees with them.

The definition of the Cymbium family I ſtate thus. Shells, in their external ſhape reſembling a ſhip or boat, whoſe upper part or head is narrow, turns ſpirally, and is like the ſtern; the reſt of it widens to the other end, is quite hollow, forms a horizontal aperture, and lies lower than the ſtern or ſpiral end.

The ſpecies of this family are very few, not above three or four. And thoſe known are browniſh or whitiſh, and thin almoſt as paper, whence they have obtained the name they bear of *Paper Nautili.*

Theſe Shells have by moſt authors been ranked with the common Nautili, by the name of Nautili Vacui, on account of their ſailing; but it is evident, that in ſtructure they have not the leaſt affinity to one another.

Gualtieri has made them a different genus, and named it Cymbium, which name I have adopted. Linnæus alſo makes it a diſtinct genus, and calls it Argonauta.

It is this family that is the true Sailor, the very Nautilus or Pompilus of the Greeks and Latins, and which our celebrated Engliſh poet refers to,

> "Learn of the little Nautilus to ſail:"

for I do not find that it is proved in any ſatisfactory manner, that the other kind, or pearly Nautilus, ever ſails, or navigates his Shell.

Pliny *, as uſual, gives a conciſe but elegant recital of its navigation. It ſails, ſays he, after having diſcharged or pumped the water from its Shell, aloft on the ſea, extending a membrane of an admirable

---

* Plinii Hiſt. Nat. lib. ix. c. 29. Inter præcipua autem miracula, eſt qui vocatur Nautilos, ab aliis Pompilos. Supinus in ſumma æquorum pervenit, ita ſe paulatim ſubrigens, ut emiſſa omni per fiſtulam aqua, velut exoneratus ſentina, facile naviget. Poſtea prima duo brachia retorquens, membranam inter illa miræ tenuitatis extendit. Qua velificante in aura, cæteris ſubremigans brachiis, media cauda, ut gubernaculo, ſe regit. Ita vadit alto, liburnicarum ludens imagine, & ſi quid pavoris interveniat, hauſta ſe mergens aqua.

thinneſs, and caſting backwards two of his arms, for he rows with the others, he ſteers his courſe, till, refilling his Shell with water, he ſinks himſelf to the bottom.

Theſe Shells are found in many parts of the Mediterranean, and alſo in the Eaſt-Indies. Mr. Argenville, in his Zoomorphoſe, p. 29, gives us a recital of the lateſt obſervations relative to the animal and its ſailing. The fiſh is of the Polypus or Pourcuttle kind; its head is pretty big, with two large eyes; it has eight arms or legs, of a ſoft fleſhy ſubſtance; they are thicker towards the body, and are connected, or webbed together, by a ſlight membrane. They are of a ſilvery colour, ſet with ſuckers or knobs on the ſides, are flatted like oars, and ſerve him to ſwim; and with theſe he ſeems to row and ſteer his veſſel. The ſix foremoſt are ſhort, and he balances himſelf and extends them as he ſwims. The two hinder ones, longer than the others, he plunges in the ſea, to ſerve as a rudder; and theſe uphold the ſkin, or membrane, which he uſes for a ſail to ply the wind. Thus equipped, he navigates in calm weather; when fearful of danger, he retires within the Shell, by which action it gains water, and ſinks to the bottom. He often pumps the water out, and alſo often quits the Shell, which, floating empty, is carried by the waves, and daſhed to pieces on the rocks.

The fiſh quits the ſhell at pleaſure, for he is not attached to it by any part of its body. Frequently he turns himſelf and ſhell topſy-turvy, and riſes with his head downwards from the bottom of the ſea, and, when he has gained the ſurface of the water, turns his ſhell very nimbly empties the water in it, extends his arms, and ſets ſail. They are frequently found without their Shells; and the fiſhermen muſt even be extremely expert to catch them in it*.

---

* I much ſuſpect this account; but I cannot deny it to be true, though I know not of any animals, that have

The tenth family I ſhall call the Ear Snails, or Auris-Cochlea, a combination of two names, which expreſſes the affinity theſe Shells have to the Sea Ears, while, at the ſame time, they are truly a kind of Cochlea or Snails. This Shell is called the Venus Ear. See Pl. III. fig. 7, 8, in two views.

Their ſhape ſo much reſembles the Sea Ears, that moſt authors have ranked them in that family, and call them non-perforated Sea Ears. Liſter and Gualtieri rank

---

have proper domicilia, who quit them voluntarily. Fear or neceſſity may poſſibly cauſe this ſeparation ſometimes. Beſides, as this animal may be ſuppoſed to frame its own habitation, like others of the teſtaceous kind, it ſeems neceſſary to have an attachment, however ſlight, to ſome one point, as that from which it uniformly extends itſelf for the formation of its ſhell: if this was not the caſe, is it poſſible to conceive, that a ſhell ſo delicate, ſo regular in every reſpect, could be fabricated?

them as Cochleæ, and Linnæus places them in a genus he calls Helix.

I define the Auris Cochleæ, or Ear Snails, as follows. Shells ſo wide and open as to reſemble Sea Ears, but are not perforated or ſet with a row of holes. They have a broad ledge along one ſide, which projects over the cavity, and turbinates into one ſingle flat ſpire, quite even or level with the bottom of the Shell. This ſpire is alſo very wide, and extends to near the middle of the bottom or under part: ſo that this family abſolutely participates of the characters and ſhapes of the Sea Ears, and of the Snails, and is, as it were, a combination of thoſe two families, as alſo one of the innumerable inſtances of the inſenſible progreſſions nature takes from one family to another; which progreſſions baffle human powers to limit, or the refined definitions of the moſt accurate naturaliſts.

There are very few Shells of this family.

The eleventh family is the Cylindri, Cylindars or Olives. Shells of a cylindrick form, and ending pointed at the lower end; the mouth is long, narrow, (apertura linearis), and notched on the top; the notch turning backwards, is large and ſomewhat awry, like the mouth of a flat fiſh; the pillar is faced half way down, and is greatly wrinkled or pleated; the turban generally ſhort, very pointed, and with the whirls or ſpires nearly level, or meerly prominent one from the other; and the turban itſelf is divided from the body by only a meer prominent line. Pl. V. fig. 4 the Panama or Camp. Pl. V. fig. 7, another Cylindar o r Olive.

This family in moſt authors is placed nearly in the ſame manner. Liſter calls them, Rhombi ſive Strombi Cylindracei, Lib. iv, Sect. x. Part 1. c. 1 & 5. Rumphius forms a Genus of them he calls Cylindri. Argenville makes them his eleventh family, and names them Rhombus, Cylindrus, vel Olea. Davila places them as two Genera of Volutes, viz. as the ſecond genus or cylindrical Volutes or Rouleaux, and as the third genus or dentated Volutes or Olives: and Meuſchen, whoſe ſeventeenth genus they are, alſo calls them Cylindri ſive Dactili.

Gualtieri names them Cochleæ Cylindroideæ, and places them the next Genus after the Volutes, to wit, Genus 2. of ſection I. of claſs 1. of the third part; and Linnæus ranks them in his Genus of Voluta, by the name of Cylindroideæ.

This family I ſhall divide into two genera, viz.

Genus 1. Cylindri emarginati, or ſuch whoſe edge is quite even and ſharp. And

Genus 2. Cylindri marginati, or ſuch whoſe edge is not ſharp and ſmooth, but has a very thick border, which turns over into a very prominent ledge on the back, like to the Helmets.

The ſpecies of this family are many, and very beautiful Shells.

The twelfth family of the Univalves is the Voluta or Volute. It is very numerous in its ſpecies, and is the family which, for richneſs and beauty of colouring, ſurpaſſes all the other families of the Univalves, and is reckoned the ornament or capital object of collections. The far greater number of Volutes always bear a value; ſome kinds, as the Admirals, &c. have fetched ſurprizing prices when perfect Shells; and the *Cedo Nulli* is ſo extremely rare and beautiful, that it is now rated at the prodigious ſum of one hundred guineas. Pl. V. fig. 3, 8, and 9. are Volutes.

The Volutes are Shells of a pyramidical or conic ſhape, for the baſe is flat and wide, and the body riſes gradually into a ſharp point at the top. The turban is the baſe, and all the whirles are diſtinguiſhed by ſlight linear prominences: ſome kinds have this baſe quite flat, or a perfect Helix, as Pl. V. fig. 9. In others it prolongs into a ſharp clavicle, as in the Imperial Crown, the Fleabite, the Flamboyante, as in Pl. V. fig. 3 and 8. However, theſe differences of the turban or clavicle are not eſſential enough to cauſe a ſubdiviſion into different genera; though Davila's ſecond genus of Volutes, he calls Rouleaux, is formed on theſe differences.

The aperture of the Volutes runs the length of the Shell: it is ſo extremely narrow as to be linear, (apertura linearis) is all along of equal breadth, and reſembles a meer ſlit or ſent. The Volutes have no inner lip.

Dr. Liſter calls the Volutes, Rhombi vel Strombi Cylindro-pyramidales, Part II. Section X. of lib. iv. Linnæus calls the genus *Conus*, and tranſpoſes the name of Voluta to the Mitres, Perſian Crowns, Cylindars, and other Univalves, that have their pillar pleated or wrinkled. Gualtieri calls them Cochleæ conoideæ, the firſt genus of part iii. claſs 1. or Cochleæ longæ; and moſt other authors, as Rumphius, Argenville, &c. make a diſtinct genus of them, by the eſtabliſhed name of Voluta.

The thirteenth family I ſhall call Globoſæ, or Tuns, and define them, Shells moſt generally of a ſomewhat globoſe ſhape, the body being greatly ſwelled, or rounded, from whence they acquire the name they bear of *Globoſæ*, or *Tuns.* They have ſhort turbans; the mouth is extremely patulous or wide, and very large; the upper part of it ends in a wry channel, like a ſoal's mouth, which is very ſhort, and turns backwards. None have a pillar or columella lip; though in ſome, as the Perſian Crowns and Melons, the columella or pillar itſelf is wrinkled or pleated. Pl. IV. fig. 8. a ſmall Melon. Pl. IV. fig. 9, a curious and rare knobbed Tun.

The Shells which come under this family are the Tuns, Partridges, Figs, Harps, Perſian Crowns, and Melons.

The rank of this family, in ſyſtematical authors, is, that Liſter places thoſe with a wrinkled or pleated pillar, as the Perſian Crowns, &c. among his Whelks of the ſame ſtructure, Lib. iv. Section XI. the

Tuns

Tuns and Figs among his Buccina Ampullacea, Section XIII. and the Partridges, in cap. iv. of Section XV.

Linnæus likewiſe places thoſe with a wrinkled or pleated pillar, on account of that ſtructure, in the genus he calls Voluta; and the Partridges, Tuns, Harps, &c. among his Buccina.

Rumphius calls them Cochleæ Globoſæ, as alſo Argenville, who makes them his fourteenth family; Davila his ninth family, and divides them into three genera; Gualtieri has placed the Figs as Cochleæ Pyriformes; and the Tuns he calls Cochleæ Caſſidiformes, and Caſſida.

This family is not very numerous; however, it contains ſome extremely beautiful and curious Shells.

The fourteenth family is the Caſſides or Helmets. I define it Shells ſemi-globoſe, the back being very convex or round, the under, or mouth part, flat. They have near flat, or, at moſt, very ſhort clavicles or turbans. The mouth is long, rather narrow, and ends at top in a gutter, which turns very large, ſtrong, and wry on the back; the lip is always ſtrongly and thickly toothed, and riſes into a high thick border, or ledge, on the upper part or back; and the pillar is moſt generally ſtrongly toothed, ridged, or ſet with ſmall bumps or aſperities. Pl. IV. fig. 10, a helmet ſhewn on the flat or mouth ſide.

Some ſyſtematical authors have agreed with me in making a diſtinct or particular family of theſe Shells, and call them Caſſides. Such are Rumphius, Meuſchen, and Gualtieri.

Linnæus ranks them as Buccina, Argenville and Davila as Murices; and, laſtly, Liſter among his Buccina, Lib. iv. Section XV. c. 7 and 8, by the name of bellied or ſwelled Whelks with a wry mouth.

This genus is not very numerous, but ſome of the ſpecies are extremely large and heavy.

The fifteenth family is the Trochi, or Tops. Shells of a conic or pyramidal ſhape, the top being broad and flattiſh, and gradually tapering thence to a very ſharp point. The aperture or mouth is moſt generally angular, low, and narrow. Pl. III. fig. 13. a trochus.

It is remarkable, that all the authors who have wrote on Shells, agree in this genus and in its characters; ſo that few Trochi are found miſplaced.

It is a very numerous family, and abounds with curious and fine Shells.

There is a foſſil ſpecies of Trochus, which to me ſeems yet undiſcovered recent. A large kind, flattiſh, and like a Cochlea Helix, generally about two inches in diameter, and ſtrongly and thickly wrinkled, with ſharp prominent ridges like plates, which are ſpiked at regular diſtances; theſe run acroſs the ſpires; but the whole Shell is likewiſe ſlightly ſtriated, according to the run of them. This Trochus is found in the Limeſtone of Coalbrookdale in Shropſhire, and Dudley in Staffordſhire.

The ſixteenth family is the Cochleæ, or Snails; the character of which is a round mouth or approaching thereto, perfectly bordered, circumſcribed, or defined, (ore integro.)

I ſhall divide this family into five genera; to wit,

1. Nerits, (Nerita) or Snails with ſemicircular mouths. (Semilunares.) Pl. III. fig. 14.

2. Helices, or Snails that are flattiſh, and whoſe ſpires lie, as it were, between two planes or levels. Pl. III. fig. 10.

3. Snails with a ſhort or flat turban. (Clavicula breviore.) Pl. III. fig. 11.

4. Turbo, or Snails with a produced or lengthened turban. (Clavicula longiore.) Pl. III. fig. 12.

5. Cochleæ Strombiformes, or Snails whoſe turbans are extremely long and ſlender. (Clavicula tenui & longiſſima.) Pl. III. fig. 9.

I ſhall take each of theſe genera ſeparately. And to begin: The firſt genus, or Nerits, are Shells whoſe mouths are a half circle, the columella or inner lip running diametrically acroſs it in a ſtrait line. This lip is very broad or faced, and extends greatly on the columella. They are very full-bodied Shells, nearly globoſe; and the turban is never much produced, but lies flat or level with the bottom.

The Nerits are moſt generally toothed on both lips.

The arrangement of this genus in all authors is near to or with the Snails; and they are moſt generally called Nerits. Rumphius calls them Cochleæ Valvatæ, and by many they are alſo called Semilunares.

The ſpecies of this genus are very numerous, and they are generally beautiful Shells. Pl. III. fig. 14, the Magpye Nerit ſhewn in two views.

There is found, in a calcareous ſubſtance in France, a large kind of foſſil Nerit, which I ſhall call the *Limpet-like Nerits*. It is a very thick Shell, ſize of an apricot, and rather flattiſh. The upper ſide is fine cheſnut brown, ſomewhat convex, and riſes to a knob or point which is not central, but placed ſideways. It is this upper ſide that reſembles a Limpet. The under part is quite milk white, flattiſh, and round; the mouth ſemicircular, the inner lip riſes or ſwells, expands or faces quite to the upper ſide, and is toothed with two ſtrong teeth. It is a very curious ſpecies, and is ſtill undiſcovered recent, or from the ſea.

Helix. My character of this ſecond genus is, that they are moſt generally round mouthed Snails, whoſe ſpires lie horizontal, or between two levels. Pl. III. fig. 10, the Planorbis River Snail.

The arrangement this genus bears with ſyſtematiſts is among the Snails. Moſt of them being land or freſh water Shells, are placed by Liſter among the terreſtrial and fluviatil Snails; and the Dolphin, a ſea kind, he has placed, Lib. iv. among the ſea ſnails. Gualtieri, like Liſter, places many among the land and river Shells; and the ſea ones he ranks as Cochleæ depreſſæ. Argenville and Davila place them with the Cochleæ ore depreſſo, or Trochi; and the other authors rank them indiſcriminately with Snails, by the names of Poſt-horns and Lamps.

There are many curious ſpecies of this genus.

The third genus of Snails has a very ſhort, or but little produced turban, (Clavicula breviore) and that is their only character, they agreeing in the mouth and other particulars with the reſt. Indeed, I have formed this genus more for regularity and clearneſs in the method, than on account of its having any eſſential diſtinct character; and in moſt authors they are indiſcriminately intermixed with all the Snail kind. Pl. III, fig. 11, the umbilicated whitiſh thin Snail.

However, as it renders the method more eaſy, I have ranked them in a diſtinct genus: for it is very fertile in ſpecies, the common land Snails and many others numbering in it.

The Snails with a produced or lengthened clavicle or turban, (Clavicula longiore) which I ſhall particularly call Turbo, form the fourth genus. Theſe moſt generally have a perfect round mouth; the columella or inner lip is not much faced outwards, and the body ſpire is very bellied, ſo that the turban is not inſenſibly, but ſuddenly or diſproportionately produced from it, like as in the Buccina. Pl. III. fig. 12.

The arrangement and names this genus of turbo bears with ſyſtematiſts is as follows. Liſter places them as a ſection of the Snails. Gualtieri calls them Cochleæ Marinæ Terreſtriformes. Rumphius, Argenville,

genville, Davila, and Meuſchen, Cochleæ Lunares, or round mouthed Snails, and Linnæus, Turbo.

There is a vaſt number of ſpecies of this genus, moſt part very fine Shells. Among them is the Gold Mouth, the Silver Mouth, the Serpents Skin, the Midas Ear, Land Snail, &c. And if that valuable Shell the Wentletrap proves not to be a Vermiculus Penecillus, as I have hinted above, then it is a Shell of this genus.

It is an anecdote of the Wentletrap worthy to be tranſmitted, as it ſhews the value of particular ſpecies at times, that in 1753, at the ſale of Commodore Liſle's Shells at Langford's, four Wentletraps were ſold for ſeventy-five pounds twelve ſhillings, viz.

	£.	s.
Firſt Day, Feb. 21, Lot 96, one not quite perfect - - - -	16	16
Third Day, Lot 98, a very fine and perfect one, - - - -	18	18
Fourth Day, Lot 101, one for -	16	16
Sixth Day, Lot 83, one for - -	23	2
	£. 75	12

The fifth and laſt genus of Snails is what I ſhall call Cochleæ Strombiformes: (Clavicula tenui et longiſſima) for they are very long and ſlender Shells, tapering to a ſharp point, and therefore exactly reſemble the Needles or Strombi, whence I have named them *Strombiformes*. Pl. III. fig. 9.

Theſe Snails have a perfect round mouth, well defined or bordered, by which particular alone they are immediately diſtinguiſhed from the Strombi, whoſe length and ſlenderneſs they emulate; for the mouths of the Strombi are long, and have a very thick columella aſide them, erect, and ſomewhat twirled; and many kinds beſides prolong into a wry gutter, turning backwards, like the mouth of a Soal, or other flat-fiſh.

The firſt, or body whirl or ſpire, is not more than proportionably ſwelled, ſo that the whole Shell gradually tapers to a ſharp point.

Liſter, who is critically methodical, has arranged this genus as Snails with a very long and ſlender turban. Rumphius intermixes them with the Strombi, as does alſo Argenville, Gualtieri, and Davila, who call them Turbo or Strombus. Meuſchen likewiſe intermixes them, and Linnæus ranks them in his genus of Turbo.

There are not many ſpecies of this genus.

A Foſſil kind is found in the ſand pits at Woolwich in Kent, in immenſe quantities, which to me ſeems to be a ſpecies yet undiſcovered living or recent from ſea. I call it Cochlea Strombiformis, clavata, from one inch and a half to two inches long, wrinkled, or ſtriated the run of the ſpires, and each ſpire is alſo circularly ſet with a row of depreſſions, like the marks of heads of nails.

The ſeventeenth family is the Buccina, in Engliſh Whelks. It is chiefly this family that creates the many differences among authors, and the confuſion that is hardly to be unravelled. The immenſe quantities of ſpecies it contains, and the many ſubordinate characters of them; which ſubordinate characters moſt authors have attended to, and made them eſſential inſtead of ſubordinate, has produced all the perplexity and confuſion we meet with relative to this family.

The error of authors in ſetting aſide the figure of the mouth, which I make the eſſential or head character of all turbinated Univalves; and framing their genera from ſubordinate characters, is not more viſible in any family of the teſtaceous animals, than in this. For the Shells called *Buccina* by the ſeveral Conchologiſts, inſtead of being a ſet of ſimilar mouthed Shells, is indeed a farrago, or jumble of ſeveral families, all placed pell-mell, or confuſedly together: and Liſter, though erroneous in ſeveral particulars, by ranging many kinds not truly Buccina, with Davila, are, in my opinion, the only authors who have arranged this family with any propriety or order.

Argenville, after criticiſing Liſter very unjuſtly, as I have already obſerved, makes the eſſential or head character of Buccina, to be a broad and very lengthened mouth: but he nowiſe further diſtinguiſhes the ſeveral genera, and therefore is a ſcene of confuſion. Davila, who follows and corrects his method, defines them to have a large oblong aperture, and divides them into four genera; but the firſt genus which he calls whole-mouthed *, without a tail or gutter, is my genus of Turbo among the Cochleæ or Snails, and are not Buccina; for their mouth is perfectly circumſcribed or bordered: ſuch are the Midas's Ear, and others; for theſe Shells, though in ſhape and appearance they ſeem Buccina, yet, their mouth being perfectly circumſcribed or bordered, and devoid of gutter or break, ſtrongly diſtinguiſhes them. Linnæus defines the Buccina extremely well by an oval aperture ending in a gutter; but his ſections of them are perplexed and vague. The other authors, as Buonanni, Rumphius, Seba, &c. give no character for Buccina, but range Shells as ſuch, only as their fancy ſurmiſes.

---

* Buccins, à bouche entiere dépourvue de queue.

I ſhall now define all Buccina to be Shells whoſe mouths are an oblong or very lengthened oval, the upper part whereof is produced or lengthened into a gutter or ſlight beak: all other characters are ſubordinate, and ſerve only to conſtitute the different genera of the family.

On this principle I ſhall divide the family of Buccina or Whelks, into the ſix following genera, viz.

1. Buccina Canaliculata, vel Buccina roſtro Canaliculato. Guttered Whelks, or thoſe whoſe upper part of the mouth ends in near a ſtrait, and ſomewhat prolonged gutter. Pl. I. fig. 3, 4, 5.

2. Buccina Recurviroſtra, vel Buccina ore quaſi abſciſſo, Canaliculo recurvo; Buccina plagioſtoma. Wry-mouthed Whelks, or thoſe whoſe mouth is, as it were, cut ſhort at top, for the gutter or beak does

not extend ſtreight forward from the upper part of the mouth, but bends or falls on the back, in a wry manner, exactly like the mouth of a ſole or other flat fiſh. Pl. IV. fig. 1, 2.

3. Buccina Roſtrata, vel cum roſtro longiſſimo. Beaked Whelks, or thoſe which have a very lengthened beak; as the Crane, Spindle, Purpuræ, &c. Pl. IV. fig. 4, 5. Pl. V. fig. 6.

4. Buccina Umbilicata. Umbilicated Whelks, or ſuch as have an umbilicus or perpendicular hollow, or navel, aſide the columella or pillar-lip, on the firſt or body whirl. Pl. IV. fig. 6.

5. Buccina Columella dentata, vel plicata. Whelks with a wrinkled, or pleated pillar. In theſe the Columella or Pillar-lip is wrinkled, ridged, or wrought with pleats. Pl. IV. fig. 3.

6. Strombi,

6. Strombi, or Needles, are Buccina with a very long and taper clavicle or turban, and a wry-mouth turning on the back, in ſome ſpecies of ſuch length as to be like a ſpur. Pl. IV. fig. 7.

Genus 1. Buccina Canaliculata, or guttered Whelks; becauſe the top of the mouth prolongs itſelf ſomewhat into a near ſtrait cylindric gutter, and the inner or columella-lip is always extremely ſmooth. Pl. I. fig. 3, 4, 5, a common Whelk.

The ſpecies of this genus are very numerous. The varieties of work and ſhape, which are only ſubordinate characters, are amazing.

The rank theſe guttered Buccina, or Whelks, hold in ſyſtematical authors, is as follows: Liſter's ſection xiv. of his Book IV. is, for the greater part, of this genus. Gualtieri places thoſe with ſhort clavicles or turbans, Tab. 26, among what he calls Cochleæ pyriformes; and thoſe with produced turbans, tab. 43, he calls Buccina. Davila makes them the third genus of Buccina, which he calls Buccina * whoſe mouths terminate in a ſhort tail. Linnæus ſtrangely intermixes them among his ſeveral ſections; and the other authors place them indifferently, and only as Buccina.

Genus 2. Buccina recurviroſtra ſive plagioſtoma, Buccina oris apice quaſi abſciſſo, roſtro vel Canaliculo parvulo recurvo, & extrorſum porrecto. Wry-mouthed Whelks. The top of the mouth of this genus is not prolonged or extended forward, but has a notch or crooked gutter, which turns outwards on the back, and exactly reſembles the mouth of a ſole or other flat fiſh. Pl. IV. fig. 1, the furbelow, and fig. 2, the Grimace.

---

* Buccins, à bouche garnie d'une queue peu longue.

The ſpecies of this genus are very numerous; and the varieties of their ſhapes and works are vaſtly diverſified.

I do not find that any authors, except Liſter and Davila, have made a ſeparate genus of theſe Whelks, ſolely on account of this character. Liſter ranges moſt of them in ſect. xv. of lib. iv. and calls them Whelks* whoſe tops are ſhort, or do not extend beyond the mouth. Davila makes them his ſecond genus, which he calls Whelks † with a notched mouth without any beak.

The third genus of Buccina I make to be thoſe with a very long and extended beak, (Buccina longiroſtra), ſuch as the Purpuræ ‡, Tower of Babel, Crane, and others. Pl. IV. fig. 4, the Crane, and fig. 5, the Thorny Woodcock.

---

* Buccina qua roſtrum breve oris hiatum non excedens.

† Buccins à bouche échancrée, depourvue de queue.

‡ The Purpuræ are properly to be placed with theſe Buccina longiroſtra, and not form a diſtinct genus, for the diſtinctions between them are not built on real or deciſive characters.

I do not meet with any author except Davila who agrees with this genus, and he makes them his fourth genus, which he calls Buccina *, whoſe mouths are furniſhed with a very long tail or beak.

The Purpuræ prey on other Shell fiſh, and for that purpoſe bore a round hole in the ſhells of the fiſh they feed upon, by paſſing their tongue, which is hard, boney, long, and ſharp, through the hole it bores. This practice of the animal was obſerved by the antient naturaliſts; Ariſtotle de *Part. Animal.* l. ii. c. 17. *verſus finem*; and *Plinii Hiſt. Nat.* l. ix. c. 36. The latter ſays, the tongue of the Purpura is a finger's length, by which it preys in boring or perforating other Shells, it is of ſuch hardneſs. However, I cannot conceive that the animal, properly ſpeaking, can bore or perforate Shells, as it would imply a motion of turning briſkly backwards and forwards, or on an axis or point, motions it cannot well be capable of. Perhaps therefore it may perform this action of perforating other Shells by virtue of ſome menſtruum it emits through the tongue, whereby it ſoftens or corrodes the other ſhell, and then digs out the corroded ſubſtance with the beak, and all this without any verſatile or other ſtrong motion *.

---

* Buccins à bouche garnie d'une longue queue.

Liſter

---

* I ſuſpect the doctrine contained in this article. To make this hole it is not neceſſary that the fiſh ſhould have a rotatory motion; that is, that, like a wheel, the tongue ſhould always move circularly the ſame way. It is ſufficient that it turns briſkly backwards and forwards. And, if the holes, which are moſt commonly found in ſome ſpecies of the Chamæ, and the Screw Shells particularly, are examined with a glaſs, they will be found to be ſo finely circular, that it is impoſſible to conceive any menſtruum ſhould act upon it in ſo regular a manner.

Further,

Liſter has ſeveral Shells he calls Purpuræ, but theſe more eſpecially are his Buccina Ampullacea. Rumphius and Linnæus place them among the Murices. Gualtieri calls them uPrpuræ. Argenville makes his thirteenth family Purpuræ, but gives no definition for them: and Davila follows him, except that it is his eighth family, and that he forms two genera of them, which I cannot ſay are well characterized.

The Purpuræ have obtained that name from the purple juice or dye the fiſh yielded,

Further, I do not apprehend the Purpura extracts its food by this hole. It is done with a view, either to force the animal out of its Shell, or to kill it, that it may devour it at leiſure. There ſeems to be a wiſe choice in that part fixed upon. It is in ſuch a part of the Screw Shell that the animal cannot crowd itſelf below the perforation, and eſcape the piercer: ſo likewiſe in the Chamæ and other Shells there is not the leaſt reaſon to apprehend a menſtruum.

which is ſo famous in hiſtory by the name of the Tyrian purple; becauſe it is imagined, that a Shell of this kind was firſt diſcovered to afford it: but indeed moſt turbinated Shells yield a like purple liquor.

This family of Buccina longiroſtra contains many ſpecies very rare and curious.

Genus 4. Buccina umbilicata. Umbilicated Whelks, or thoſe that have a perpendicular hollow or navel aſide the columella or pillar-lip, on the firſt or body whirl. Pl. IV. fig. 6, the Joppa Whelk.

This is the poſitive character of the genus; and all Buccina or Whelks that have a hollow or navel rank under it, whether guttered, wry-mouthed, or beaked, &c.

There are very few ſpecies of this genus.

I do not find any author who has formed a genus from this ſecond character, ſo that the Shells herein ranked are diſperſed among their other Buccina.

Genus 5. Buccina columella dentata vel plicata. Whelks with a wrinkled or pleated pillar. The Shells of this genus have the inner or pillar-lip wrought with one or more high or prominent tranſverſe ridges or pleats. Pl. IV. fig. 3, the Tiara or Papal Crown.

Theſe tranverſe prominent ridges or pleats on the inner or pillar-lip, are the ſtandard character of this genus; for all Whelks, whether beaked, guttered, &c. if the pillar is thus pleated, range herein; and there are of all kinds with this character.

However, it is very proper to obſerve, that it is only the Whelks whoſe pillars are pleated, that are to be arranged in this genus; for there are other families of Shells, as the Perſian Conques, the Murices or Rocks, &c. which have their inner or pillar-lip wrinkled or pleated in the ſame manner. Thoſe are to be placed in their reſpective families, and not here ſolely on that account.

Liſter and Linnæus are the only authors who have ranged any Shells by this ſubordinate character. It is Liſter's ſection xi. of lib. IV. Buccina columella dentata: but he has not only arranged the Buccina therein, but likewiſe all other Shells whoſe pillars are pleated.

Linnæus has done the ſame; and from this ſingle character of *columella plicata*, he has formed the genus he calls Voluta; in which not only Buccina are included, but alſo Olives, ſome Murices or Rocks, the Perſian Crowns, Midas's Ear, and other Shells of different families, pell-mell, or confuſedly intermixed.

The ſixth and laſt genus includes the Strombi, or Buccina with an exceeding long and very taper clavicle or turban.

They have a wry-mouth exactly the ſame as the ſecond genus, which ſometimes extends or turns ſo far on the back, as to be like a ſpur. Pl. IV. fig. 7, a Strombus.

All Shells ſo prodigiouſly tapering and long have been generally held as a particular family, by the name of Strombi, or Needles, only on account of their taper ſhape, and without regard to the contour of their mouth. However, I have followed Liſter, and only placed thoſe Shells here which have a wry-mouth like the ſecond genus; for all thoſe that have a perfect round mouth, I have already ranked among the Snails, by the name of *Cochleæ Strombiformes.*

Liſter, whom, as aboveſaid, I follow, calls them Whelks with an extreme lengthened and tapering turban: however, he has erroneouſly placed them among the Whelks with a pleated pillar, Lib. IV. Sect. xi. cap. 3.

Gualtieri has arranged all the taper Shells together, both round-mouthed and theſe, in his Part III. Claſs 5. and calls them Turbo, or Cochleæ with a ſmall mouth, and remarkable lengthened or taper body. The French authors Argenville and Davila call them all, Turbo and Strombus *(La Vis* or *Screws)*; and Rumphius likewiſe calls them Strombus.

Liſter, on what account I cannot divine, has called the Olives, Rhombi or Strombi; but the great Linnæus has been pleaſed to change the eſtabliſhed name of Strombus, always uſed for theſe taper Shells, to others of a quite different form; for his Strombi, except ſome few, are winged Shells or Alatæ. I have in another place taken notice of that celebrated author's licentiouſneſs in changing and tranſpoſing long-eſtabliſhed names, which I hold is very blameable.

The genus of Strombi is pretty numerous.

I have now finiſhed with the Buccina or Whelks, known recent or living from ſea. I therefore proceed to mention ſome foſſil kinds, hitherto undiſcovered in their living ſtate.

Firſt, the Buccinum heteroſtrophum, or other handed Whelk; becauſe the whirls and mouth lie to the right hand inſtead of the left; which is the moſt general manner of turbinated Shells. This ſpecies belongs to the firſt genus, and is found in great plenty, in the foſſil ſtate, in the counties of Eſſex and Suffolk. However, it is ſaid, a recent ſhell of this ſpecies was lately purchaſed for a noble collection.

Another foſſil Buccinum from France, and Hampſhire, a ſpecies of the fifth genus, or with a wrinkled or pleated pillar, yet unknown recent. Brander's Foſſ. Hanton. fig. 45.

The Murices conſtitute my Sixteenth family. As they conſiſt of many Shells that have very different ſubordinate characters, I ſhall form different genera of them; but the fixed or eſſential character of the family, is an oblong and equally narrow mouth length ways, (Apertura ſublinearis) which runs into a ſhort gutter at top. Moſt authors have added another character, that is, of always being thorny or ſpiked, bumped, or otherwiſe rough all over the ſurface, like the ſpikes or aſperities of rugged rocks, from which it has obtained the Latin name of *Murex*, the Engliſh one of *rocks*, and the French name of *Rochers*: however, I cannot allow this character to be a fixed or eſſential one.

I ſhall ſubdivide the family of Murices or Rocks into four genera, viz.

Genus 1. Murex, Rocks, or thoſe Shells that have a long and equally narrow mouth, (apertura ſublinearis) and are externally very rugged. Pl. V. fig. 5, a Devil.

Genus 2. Rhombi, whoſe ſubordinate character is, that their ſhape or contour is rhombic. Pl. V. fig. 2.

Genus 3. Alatæ, or winged Shells, whoſe lips extend into a large flap or wing. Pl. V. fig. 1.

Genus 4. Aporrhaidæ, or winged Shells, whoſe flaps or wings are bordered with large ſpikes or proceſſes, like fingers, as the ſpiders, &c. Pl. I. fig. 6, 7.

It is needleſs to mention here the rank my ſeveral genera of Murices bear to other ſyſtems, for they are placed by moſt authors in a family called Murex, or among

Buccina, ſome particulars excepted, which I ſhall ſpecify.

I now proceed regularly on each genus, viz.

Genus 1. Murex or Rocks. Shells whoſe mouth is oblong, narrow, and ends gutter wiſe at top; the clavicle or turban generally ſhort or near flat, and the pillar is wrinkled or pleated. They are moſt commonly very thick Shells, and extremely rugged and rough on the outſide, from their being wrought with bumps, prongs, foliated, and other works. Pl. V. fig. 1.

This genus is pretty numerous, and ſome of the ſpecies are vaſtly large and heavy.

Genus 2. Rhombi. Shells whoſe ſubordinate character is to have always a rhombic ſhape or contour, from which particular alone, as it carries an idea of the ſubjects propoſed, I have allotted them the name of Rhombi. Pl. V. fig. 2.

In the elder authors we find a ſet of Shells called Rhombi, ſeemingly a meer fantaſtic name without meaning or application. Thus Columna makes Rhombus, Turbo, Strombus, and Trochus, all ſynonymous terms. Liſter, as I have obſerved before, calls the Volutes and Olives, Rhombi, or Strombi; and Sibbald, Woodward, &c. do the ſame; but in the later or modern authors, we ſeldom ſee the name of Rhombus uſed. This confuſion apparently ariſes from the double meaning of the Latin word *Rhombus*, which not only ſignifies a lozange or rhombic figure, but alſo a reel, a ſpinning-wheel, a whirl, or other rolling inſtrument; and it is from this laſt ſimilitude the Olives and ſuch-like Shells have been called Rhombi by the elder authors, and not from a lozange or rhombic figure, as ſome have erroneouſly imagined.

However, I declare my appellation for theſe Shells is from their rhombic or lozange ſhape: for if one of this genus be laid down, or held, and its contour traced, the reſult will be the figure of a Rhomb or Lozange. This figure proceeds from the clavicle or turban, which is generally ſituated about the middle of the Shell, running out into very ſharp or acute angles with the top and bottom, and thereby the whole Shell fairly exhibits a rhombic ſhape, or contour.

There is ſome reaſon to ſurmiſe, that many of theſe Shells are only growths of the next genus, or winged Shells. However, as it is not the caſe of all of them, and that they all now wear this deſcribed appearance, I imagine it is neceſſary to form this genus.

This genus is not numerous, but contains pretty Shells; and ſome kinds are very large and heavy.

There is a very elegant foſſil ſpecies of Rhombus, yet undiſcovered recent from ſea, found in France and in Hordell cliffs in Hampſhire. It is curiouſly figured in Brander's Foſſilia Hantonienſia. p. 31. Pl. V. fig. 64 à 68.

The third genus is the Alatæ or winged Rocks; for ſo I name them in common with moſt authors, from their lip being greatly extended, or expanded outwards, like a flap or wing. Pl. V. fig. 1.

Some few kinds have the flap or wing quite ſimple, or with the edges even; but the greater part of theſe, as alſo of the next genus or Aporrhais, have always towards, or a little aſide of the very top of the mouth, a broad hollowed ſinus, which I call the *Scoop*, from which particular Liſter calls them Purpuræ ſeu Buccina Bilinguia, and claſſes them Section XII. of Lib. iv. Rumphius and Meuſchen make

a diſtinct

a diſtinct genus of them, they call Alatæ. Davila ranks theſe by themſelves in the third genus of his Murices, by the name of ſimple or not-pronged winged Shells; and Linnæus ranks all the winged Shells together in his genus of Strombus.

This genus is numerous, and contains many fine or beautiful ſpecies.

An elegant and large foſſil kind of this genus, not yet diſcovered living or from ſea, is found in Hordell cliffs in Hampſhire; which is accurately figured in Brander's Foſſilia Hantonienſia, p. 34. Pl. VI. fig. 76.

The fourth and laſt genus of Murices or Rocks, is the Aporrhais, or winged Shells whoſe edges are ſet with ſtrong or valid prongs or fingers: as the Spiders, Devil's Claws, &c. Pl. I. fig. 6, 7.

Davila makes theſe his fourth genus of Murices, which he calls winged Murices with prongs or fingers; but all the other authors have intermixed them with the foregoing genus.

The ſpecies are few, but they are fine Shells.

I have now gone through the firſt general diviſion of Shells, or Univalves. This diviſion is the moſt numerous of the teſtaceous animals; for I do not heſitate to pronounce, that the ſpecies of Univalves ſurpaſs, by great numbers, the two other general diviſions of Bivalves and Multivalves joined together. In this diviſion of Univalves the wonderful works of the creation are alſo manifeſted by the immenſity of beauties in their colours and ſtructures. On this account it is that Univalves are the choiceſt objects of collectors, and bear more value than Bivalves or Multivalves; for few of the latter ever fetch above five or ſix guineas, while numbers of the Volutes and other Univalves bear to ten, twenty, or thirty guineas, and even greater prices.

SECTION XI.

I AM now come to the ſecond diviſion of Shells or Bivalves; that is, double Shells, or compoſed of two pieces or parts, which, by means of proper connexion by hinges, play on each other, ſo as to open, ſhut, and perform all other functions neceſſary to the œconomy or ways of life of the animals included in them, or whoſe habitations they are.

In relation to the fiſh or animals, I have already given ſome little account; nor ſhall I further trouble my readers on the ſubject, as my ſyſtem or method is built only on the habitations or Shells, and not on the animals, or any of their parts.

This diviſion of Bivalves may be arranged into three general parts, to wit, Part 1. Shells that have unequal valves and ſhut cloſe; as the Eſcallops, Oyſters, Anomiæ, &c.

Part 2. Shells that have equal valves and ſhut cloſe; as the Cockles, Tellens, Muſcles, &c. and

Part 3. Shells with valves that never ſhut cloſe, but are always open or gaping in ſome part; as the Tridacnæ, Baſon Conques, or Bears Paws, the Chamæ, Pinnæ, and Solenes, &c.

Under theſe three arrangements all the Bivalves yet known may be ranked.

Theſe three arrangements are general ones; but, as I have already obſerved, the chief or eſſential character of Bivalves is their cardo, or hinge: it is that character I hold as the principal one of the ſyſtem, and therefore by that character alone I ſhall rank the families.

But, before I proceed on my ſyſtem, I think it neceſſary to give a compendious view of the arrangements of Bivalves hitherto ſet forth by the ſeveral ſyſtematical authors, in like manner as I did before with reſpect to the Univalves.

Liſter begins his hiſtory of the ſea Shells with the Bivalves, which he divides into two parts, and into twelve families, viz. Part I. is of thoſe with unequal valves, and contains three families, as 1. the Eſcallops. 2. the Oyſters, and, 3. the Spondyles. His ſecond part is of the Bivalves with equal valves; this contains the other nine families, and are 4. the Margaritiferæ. 5. Many-toothed Cockles. 6. Toothed Cockles in many ſections and chapters. 7. Muſcles. 8. Pinnæ. 9. Tellens. 10. Solenes. 11. Chamæ; and 12. Chama Pholas.

Liſter, in his arrangement, has great regard to the character of the hinge, though he does not entirely build upon it.

His above method wants correction in his third family, or Margaritiferæ: in his ſeventh family, his placing the Noah's Arks or boats, as Muſcles: in his ninth family of Tellens, which is not truly defined; and, laſtly, in his making two families of the Chama and Chama Pholas, which in reality have no poſitive character to diſtinguiſh them.

Dr. Grew, in his Muſeum Regalis Societatis, p. 153, gives, as his ſeventh ſcheme of Shells that of the Bivalves and Multivalves; but it is ſo confuſed and puzzling as to be uſeleſs: however, his two chief diviſions of Bivalves are into inarticulate and articulate hinges.

Breynius's ſcheme of Bivalves is very jejune and uſeleſs.

Argenville is the next ſyſtematiſt: he divides all his Bivalves into ſix families, viz. 1. The Oyſters. 2. Chamæ. 3. Muſcles, Tellens, and Pinnæ. 4. Cordiformes, or Cockles. 5. the Eſcallops; and the ſixth and laſt family are the Solens.

This author's method is entirely arbitrary and very faulty; nor does he characteriſe a ſingle family by the cardo or hinge.

Gualtieri forms his method from thoſe whoſe valves and ſides are equal or ſimilar; which is his firſt claſs. His ſecond claſs conſiſts of thoſe whoſe valves are equal, and their ſides unequal or diſſimilar: and his third claſs is of Shells with unequal valves. By this arrangement he rejects the hinges as characters, and mixes all the families together, ſolely on account of their ſimilar or diſſimilar ſides, &c. ſo that it is impoſſible to collate his method with mine, in ſuch manner as to be of any utility to the reader.

The method of Mr. Tournefort, which this author gives, divides all bivalves into two parts. Firſt, Such as ſhut cloſe all round; and, ſecond, ſuch as are always open or gaping in ſome part. This diviſion, though good, is incomplete, and his families and genera are very arbitrary.

Linnæus offers next. This celebrated naturaliſt divides all Bivalves into fourteen families, which he characteriſes by their hinges in a very accurate manner; and his method ſeems to be the moſt perfect yet publiſhed. As I ſhall have occaſion to recite this author's genera in collation with my own, I will enlarge no farther at preſent on his arrangements.

Mr. Davila forms ſix families of Bivalves, viz. 1. Oyſters. 2. Eſcallops. 3. Chamæ. 4. Heart Cockles. 5. Tellens, and 6. Muſcles: but all is very arbitrary and confuſed.

Mr. Meuſchen makes eleven families, to wit, 1. Muſcles. 2. Eſcallops. 3. Oyſters. 4. Arks. 5. Spondyles. 6. Cakes. 7. Baſons. 8. Hearts. 9. Chamæ. 10. Tellens; and 11. Solens. Moſt of theſe are miſplaced, and ſome are unneceſſary; but it is impoſſible to make further remarks on him, as his method is a meer ſheet table without any explanations.

I do not make any mention of Buonanni, Rumphius, Seba, and ſeveral others, as they give no methodical arrangements of Bivalves.

However, there yet remains an author who merits particular notice, though not a profeſſed Conchologiſt. It is Dr. Woodward I mean. The Doctor, in his catalogues of foſſils, has given a very good method of Bivalves on the character of the hinges, and alſo on the form: but his ſyſtem of Univalves is very faulty and imperfect. Dr. Woodward arranges all Bivalves in the following manner. Part I. Eared Shells, as 1. the Eſcallops. 2. the Spondyles; and, 3. the Margaritiferæ. Part II. Shells not eared, and with unequal valves, as 4. the Oyſters; and, 5. the Anomiæ. Part III. Not eared, with equal valves, as 6. the Cockles. 7. the Cunei and Tellens; and, 8. the Muſcles: and thoſe Shells which are always open or gaping in ſome part, he ranks, 9. the Solens; 10. the Chamæ; and 11. the Pinnæ.

I have now ſet forth the ſyſtems of the authors known to me, to ſhew how far they are perfect or erroneous; but I ſhall remark, that all of them, except Woodward and Linnæus, ſeem no wiſe ſcientifical, but arbitrary and confuſed.

Before I begin to detail my ſyſtem, I think it very neceſſary to ſettle the technical terms or names for the parts of Bivalves, uſeful for making their deſcriptions intelligible and eaſy, as alſo decent; for I hold in great deteſtation the obſcene terms made uſe of by the Linnean School. Syſt. Nat. p. 1069, 1070, &c.

The terms or names are as follow:

1. *The ſummit (Apex)* is the part whereon the teeth, joints, or properly the hinges are placed. Pl. VII. fig. 1. *a a.*

2. *The beaks (Umbones)* are the peaked ends of the Shell, which moſt generally ſtand behind the *ſummit*, or that part which anſwers to it. Pl. VII. fig. 1, 2, 3. *b b b b.*

3. *The margins* or *borders* (*margines*) are the edges or contour of the Shell, produced from the beak or hinge on either ſide. Pl. VII. fig. 1. *c c c c.*

4. *The ſurfaces, (ſuperficies)* concavitas & convexitas Concharum; the convex expreſſes the exterior or convex ſide of the Shells, and the concave, the inſide.

5. *The length* of a Bivalve is from the beak or hinge to the very oppoſite extreme. Pl. VII. fig. 1, 8. *d d.*

6. *The breadth* is from ſide to ſide. Pl. VII. fig. 1, 8. *e e.*

7. The margins or borders are ſaid to be *ſimilar* *, if equally produced or extended from the ſummit, or of equal length; Pl. VI. fig. 1, 3, 10, 11; and *diſſimilar*, if unequal or more extended on one ſide than on the other. Pl. VI. fig. 2, 4, 5, 6, and 8. Pl. VII. fig. 1, 5, 10, 11, and 12.

8. *The Hinge* (Cardo), ſtrictly ſpeaking, is the very part that connects the

---

[*] Conchæ æquilateræ ſunt Conchæ ex utroque cardinis latere æqualiter effuſæ.

Conchæ inæquilateræ ſunt Conchæ ex utroque cardinis latere inæqualiter effuſæ.

two valves together, that is to ſay, the teeth or joints on which they play in the actions of opening and ſhutting. Pl. I. fig. 13, 14, and 15. Pl. VI. fig. 1, 2, 3, 4, *a.* 11, *b.* Pl. VII. fig. 5, 11, and 15.

9. A hinge is *inarticulate* when not ſet with any viſible joints or teeth. Pl. I. fig. Pl. VI. fig. 2, 3. Pl. VII. fig. 9, and 15. *Articulate* when ſet with ſome few. Pl. I. fig. 14. Pl. VI. fig. 4. *a.* 11. *b.* Pl. VII. fig. 1, and 5. *Multarticulate*, when ſet with many or a large number. Pl. I. fig. 15. Pl. VI. fig. 6 and 9. Pl. VII. fig. 11.

10. *The furrow, (Sulcus canaliculus)* is the gutter or furrow, when the Shells are cloſed that runs along parallel to the hinge.

11. *The ſlopes, (Declivitas)* are the places which ſlope or ſlant from the beak down the ſides, and generally are ſlightly flatted, ſhallow, or concave. Pl. VII. fig. 2, 3. *f f f.*

The *ſent (Rima)* is the opening of the Shells on the ſlopes.

The cartilage (*Cartilago*) joins the valves together at the furrow and at the ſlopes.

12. *The flat (planities, latus complanatum)* is that ſide of thoſe Shells that is flat; as the flats of the Heart Cockles, Bears Paws, &c. Pl. VI. fig. 5, 8, and 12. Pl. VII. fig. 4 and 10.

I ſhall here repeat the obſervation made at the end of the Univalves, which is, that the ſpecies of Bivalves are very few when compared to the immenſe numbers of ſpecies of Univalves; nor are they comparable to them for beauty: and, further, that there are no land Bivalves, and few of freſh water; whereas the ſpecies of Land Univalves are extremely numerous, and many kinds alſo occur in freſh waters.

Now to my method or ſyſtem.

SECTION XII.

DIVISION II. BIVALVES.

PART I. Shells that have unequal valves, and ſhut cloſe.

Family 1. Pectens or Eſcallops. Though ſome ſpecies of this family have equal valves, yet, as the far greater number have unequal valves, to wit, a flat and a concave, I range them under this part. The ſame particular likewiſe occurs in the families of the Spondyles and Oyſters.

The head or eſſential character of the Eſcallop family, is a trigonal ſinus. Pl. VI. fig. 1. *a.* and an elaſtic cartilage for its hinge in the very center of the top of the Shell.

The ſubordinate characters of Eſcallops are being eared; indeed moſt authors have injudiciouſly made it the chief character, whereas there are other eared Shells beſides Eſcallops, as the Spondyles, Margaritiferæ, &c. and, *vice verſa*, there may be Eſcallops without ears. The other ſubordinate character is to have the top run into a perfect ſtrait line, and thence gradually widen to a round bottom.

The ſpecies are numerous, ſome whereof are very curious and of great beauty, as the *Ducal Mantle.* Pl. VI. fig. 1. the *Compaſs* or *Sole*, the *Duck's Foot* or *Coral, Eſcallop*, &c.

It is worthy remark, that the colours of the under Shells of Eſcallops are always fainter than the colours of the upper Shells, and ſometimes the valves are differently coloured, as the *Compaſs* or *Sole*, which has one valve of a cheſnut brown, the other valve milk white.

Moſt authors rank theſe Shells as a particular family, and call them Pectens. Gualtieri makes different genera of thoſe with equal, and thoſe with unequal valves; the former he calls Pecten, the latter Concha Pectinata; and the Eſcallops with unequal or ſingle Ears he calls Pectunculi: Linnæus makes them a genus of Oyſters, and has accordingly arranged them with, and by the names of Oyſters in his 313th genus.

It is ſaid, that Eſcallops will move ſo ſtrongly as ſometimes to leap out of the catcher wherein they are taken way: their of leaping, or raiſing themſelves up, is by forcing their under valve againſt the body whereon they lie.

The chief kinds of foſſil Eſcallops yet undiſcovered, recent or living from ſea, are as follow.

Firſt. Size of the common Oyſter, with large but unequal ears, of a perfectly round contour; the ſurface tranſverſly thick ſet with prominent ſharp thin ridges, like plates. The valves are equal. Theſe are found very frequently in the quarries at Thame in Oxfordſhire.

A ſecond kind very elegant, about double the ſize of a Cockle, the valves unequal, one being quite flat, the other exceeding concave. It is thickly ridged length-ways with many common ridges and intermediate ones, that are very prominent or high, and the furrows are broad and deep. It is found in the quarries of Dorſetſhire, Wiltſhire, and the adjacent counties, as alſo ſometimes in the chalk-pits of Kent and Surrey.

The ſecond family is the Spondyli. The Spondyles are moſt generally eared Shells with unequal valves, rude or uncouth in ſhape, partaking of the ruggedneſs of the Oyſter with ſomewhat of the Eſcallop form, ſo as to ſeem a medium between the two families. However, the Spondyles like the Eſcallops, have ſome ſpecies with equal valves, and without ears.

The head character is the hinge, which in the upper Shell conſiſts of a triangular hollow and cartilage, like the Eſcallop, in the very center, on each ſide of which is a large deep cavity, and a very large thick and prominent tooth or joint lies on each ſide of the cavity. Pl. VI. fig. 4. *a*.

The ſummit and beak of the under valve is alſo extremely thick and ſtrong, and extends from the hinge outwards into a broad triangular ſlope or flat.

Some kinds of Spondyles are thickly and curiouſly ſet with long thorns or ſpikes; theſe are generally, and very erroneouſly, called *Thorny Oyſters*, and, when perfect, are greatly valued. Pl. VI. fig. 4.

This family is not very numerous in its ſpecies.

Liſter, Woodward, Gualtieri, Linnæus, and Meuſchen, all rank them as a particular genus, by the name of Spondylus; but Rumphius, Argenville, Seba, and Davila, rank them very erroneouſly as Oyſters.

The third family is the Oſtreum or Oyſter. The Oyſters have unequal valves, though there are ſome ſpecies that have equal valves, but none are eared. The hinge of this family has not any teeth, but conſiſts of one large inarticulate gutter running the length of the top of the Shell, in both Shells alike, and is covered and filled with a ſtrong cartilage, as in Pl. VI. fig. 2. *a.*

The ſpecies of this family are very numerous; ſome are curious though not beautiful, and bear a large price, as the *Hammer Oyſter*, the *Cockſcombs*, &c.

This family is ranked as a diſtinct one by all authors, but with many additions or omiſſions: as for example, Linnæus ranks the Eſcallops with them, and Argenville, and others the Spondyles, while Liſter ranks the Hammer Oyſter, and ſome others, as Eſcallops.

The foſſil Oyſters yet undiſcovered recent or living from ſea are very many; the chief of them are the *Gryphytæ* of foſſilogiſts, of which there are ſeveral ſpe cies; and a very large flat kind with equal valves, found in Shotover and Heddington quarries in Oxfordſhire. Pl. VI. fig. 2.

The fourth and laſt family of Shells with unequal valves and that ſhut cloſe, is the Anomiæ.

This family has long been known foſſil, and contains a great number of ſpecies, all of which, except three or four, remain yet undiſcovered recent or living from ſea; and even theſe few known are diſcoveries made within theſe twenty years paſt.

Columna firſt mentioned ſome foſſil ſpecies, and he being convinced that all foſſil Shells were real exuviæ or ſpoils of animals, and not finding theſe deſcribed or noticed by Conchologiſts as Shells, called them Conchæ rariores Anomiæ; which word *Anomia* has ſince been ſo generally uſed for them, that it is now become the univerſal and eſtabliſhed name of the family.

Columna deſcribed and figured ſome foſſil kinds. Liſter has alſo figured ſeveral in his Appendix de Conchitis to his Hiſtoria Conchyliorum; but no recent kind being diſcovered ſo early, is the reaſon that neither he, Buonanni, Rumphius, or other early authors, have taken any notice of them.

Woodward was the firſt who arranged the Anomiæ from the foſſil Shells. He kept the eſtabliſhed name, and ranked them with the Shells of unequal valves, and not eared; and further defined them to have both valves convex, and one of them beaked. He then arranged them into ſmooth, ſtriated, and ſulcated, each of which articles has ſeveral neceſſary ſubdiviſions.

Woodward had only foſſil Shells to inſpect, conſequently could not accurately define their peculiar interior ſtructure, or their hinge: his definition however is very juſt, except that he makes both Shells convex, which is not ſo in ſeveral ſpecies.

Gualtieri, who figures three recent kinds, Pl. XCVI. has made a particular genus for them, and calls it Terebratula. He defines them, very erroneouſly, as Shells with equal valves, and diſſimilar ſides, of a peculiar ſtructure, for inſtead of a beak it has a perforation, and alſo has a very ſingular articulation or connexion withinſide. The ſaid author's figures are very good.

Linnæus, who has enjoyed the diſcoveries of the recent or living Shells, has made them his genus 314 Anomiæ. He has mixed the recent with the foſſil kinds, and defines them to be Shells with unequal valves, one valve being flattiſh, the other convex, the beak perforated, and the hinge inarticulate or toothleſs.

However, he has much confuſed his genus and the ſpecies; for he propoſes the Gryphites, which, by all its characters, is a true Oyſter, and the pellucid or glaſs Chineſe Oyſter, improperly ſo called, as ſpecies of Anomiæ; beſides many other inaccuracies.

As for Argenville, he figures the recent Anomia lævis very badly, and without any further reflection, places it among his Heart Cockles; but, in his additional plates of the ſecond edition, he gives a very good figure of the ſmooth kind.

But Mr. Davila treats them ſyſtematically, and as a genus of his firſt family or Oyſters. He defines them as Shells whoſe beak or top of the under valve is perforated, and riſes curved up on the upper valve. He does not however particularize any characters of the hinge, though he gives an excellent figure of the inner ſtructure, or *appendices*, as he calls it, of one kind. Pl. XX. fig. *a.*

He alſo gives other figures in the ſaid plate, but two of them, viz. D. and E. are not teſtaceous animals. He deſcribes them, p. 311, & ſeq. in the following manner; the hinge of the under valve is compoſed of two ſmall hooks, which are taken in or hinged into the ſinuſes or cavities of the upper valve, and it has two interior appendages fixed towards the top of the upper valve: this ſtructure he obſerved in two ſpecies. In another ſpecies, the hinge was nearly the ſame, but had two long and narrow ſide appendages proceeding from the top of the upper valve, which extend themſelves to the middle of it, where they are bound or ſtopped by two ſmall ligaments, and then return again towards the top, in a very remarkable and curious manner, Pl. VI. fig. 7. And a third ſort, (which is that of Gualtieri), has an interior appendage like to a perpendicular gutter or pipe, fixed to the top, and running down to the middle of the upper valve.

I ſhall now give my definition, and characteriſe the genus as much as can be, for I hold it impoſſible to be accurately made till we diſcover more recent ſpecies; for thoſe already diſcovered recent are few, and even differ in ſome particulars; and the foſſil ſpecies, which are very numerous, never ſhew their inner ſtructure, and ſo extremely ſeldom the hinge, that as yet we cannot fix any characters with accuracy.

I ſhall therefore, under theſe circumſtances, define the Anomiæ as follows, Bivalves with unequal valves and never eared, the beak of the largeſt or under valve is greatly produced, and riſes or curves over the beak of the ſmaller or upper valve, and is perforated or pierced through like a tube a tube, from which particular they have alſo obtained the name of *Terebratulæ*. The hinge is inarticulate or toothleſs, and they have always a remarkable interior ſtructure. Pl. VI. fig. 3. *a*.

However, by what obſervations can be made, ſome of the foſſil kinds have an evident multarticulate, or many-toothed hinge. Pl. VI. fig. 10.

I am therefore led to conclude, that the valves of the Anomiæ are connected together in two ways, inſtead of being only inarticulate, viz. 1. By an inartilate hinge; and 2. By a multarticulate hinge.

The firſt ſet have no teeth or joints on the hinge; but the ſmaller or upper valve is always indented into a wide ſinus, or opening of the larger or under valve, in which it plays like a joint, when the exigencies of the animal requires opening or ſhutting. Pl. VI. fig. 3. *a*.

The ſecond ſet have a viſible and regular multarticulate hinge; exactly like that of the Noah's Arks, or the multarticulate Cockles. Pl. VI. fig. 10.

On a due conſideration of the deep grooves, the indentings, the undulated margins, and other diſtortions of theſe Shells, more than in any other genera, and by the beak, which is perforated or tubular quite to within the Shells; I am apt to imagine theſe animals ſeldom open their Shells, as moſt others do, to take their food; but nouriſh themſelves through the tube or perforated beak only.

By the obſervations made on the few ſpecies lately diſcovered recent, this my opinion ſtands in ſome manner confirmed, as the living Anomiæ have all been found lurking in the nooks between the branchings of corals, or cavities of rocks. They lie therein lifted upon their flat ſurfaces or horizontally, without any prop or ſolid body to reſt on, but are upheld or ſuſtained only by a ſtrong adheſion of their tubes or perforated beaks to the ſides of the cavities, as if in the action of ſucking; and this poſition is the general one of the recent kinds *.

The interior ſtructure of one of the recent kinds ſeems alſo not at all particularly adapted to the eſpecial uſe of opening the Shells. It conſiſts of a griſtly or boney thin ſtring, which twiſts in and out to above half-way within the Shells, like the

---

* I believe the hole in the beak of the Conchæ Anomiæ is for the purpoſe of tranſmitting a ſtrong Ligament or griſtly ſubſtance, by which they adhere firmly to the rocks, corals, &c. in the ſame manner as that claſs of Shells commonly called Bears Paws; at leaſt ſome ſpecies of them have an opening between the two valves on one ſide the hinge, through which paſſes, from the inſide of the Shells, a ſtrong ligament, whereby the fiſh adheres firmly to rocks, corals, &c. I have ſeen this ſpecies of Shell ſticking in this manner to coral.

twiſtings of Ribbands, vulgarly called *True Lovers Knots.* This is the ſecond ſort mentioned by Davila. Pl. VI. fig. 5. The other ſtructure, which is Davila's third ſort, is a guttered triangular appendage, with a cut or ſent half-way down it, fixed perpendicularly on the upper valve, from the top or beak, to the middle of the Shell.

I have been very prolix on the Anomiæ, in order to eſtabliſh what characters I could to form, if poſſible, a proper definition of this curious genus of Shells.

A very ſurprizing and unaccountable circumſtance, relative to the foſſil and recent teſtaceous animals, which has been already noted, is, that all thoſe found in immenſe quantities in the foſſil ſtate, are hardly known recent, and *vice verſa.* I inſtanced it in the Ammonia, that are found in incredible quantities foſſil all over the world, though none are yet diſcovered recent; and this family of Anomiæ, though alſo found foſſil in an aſtoniſhing abundance,

dance, has very few recent ſpecies yet diſcovered.

But to conclude, from what has been abovementioned, I ſhall divide this family of Anomiæ into two genera, to wit, Genus 1. Inarticulate Anomiæ, or thoſe in which the hinge of the under valve is a large ſinus or cavity, the corners whereof form two prominencies or joints; and the upper valve is indented into it by a correſpondent prominency to the cavity, and by two ſmall hollows, anſwerable to the two prominencies or joints. Pl. VI. fig. 3.

Genus 2. Multarticulate Anomiæ, or thoſe whoſe hinge lies on a long ſtreight line, and is ſet with many teeth, exactly like the Noah's Arks. Pl. VI. fig. 10.

Pl. VI. fig. 3. ſhews the recent Terebratula, which is alſo found in very great quantities in the foſſil ſtate; the fig, 3. *a.* ſhews the top of the under valve, and its perforation.

Pl. VI. fig. 7. ſhews the under Shell of another kind, with its griſtly appendages; lately diſcovered recent or living.

Pl. VI. fig. 10. ſhews a large foſſil kind with a multarticulate hinge, not yet diſcovered recent or living.

I now proceed to Part II. or Shells that have equal valves, and ſhut cloſe; ſuch as the Cockles, Tellens, Muſcles, &c.

I ſhall ſubdivide this Part into three Sections, viz. 1. Multarticulate, or with a great number of teeth on the hinges. 2. Articulate, or with few teeth: and 3. Inarticulate, or without any teeth.

Part II. Section 1. Leptopolyginglymi, or multarticulate Shells.

The multarticulate Shells give us three families, viz.

Family 5. Pectinoïdæ, or Shells with equal valves, generally very flat; the hinge lies on a ſtreight line like the Eſcallop, but is ſet with ſeveral parallel and ſtrait ridges and intermediate furrows, and the ſides are diſſimilar. Pl. VI. fig. 6.

There are few ſpecies of this family. Liſter ranks the two kinds he figures, Lib. iii. Part I. Sect. i. cap. 3. by the name of Pectines Margaritiferæ Polyginglymi. Woodward, among his Pectunculi Leptopolyginglymi figura oblonga, Claſs 3. Sect. 1. Art. 2. Gualtieri, Pl. 97. A. figures a kind, and calls it Concha Longa Brachiata; and Seba, Pl. 91. figures ſome among the Pinnæ, and calls them Volſella: but I cannot find them methodized in any other authors.

There is a very large and extremely thick ſpecies of this family, not yet kown recent, found foſſil at Bononia in Italy,

which

which is fully deſcribed and figured in the memoirs of the Bononian Inſtitute *.

Family 6. Pectunculi Polyginglymi, or multarticulate Cockles. The Shells of this family reſemble the Cockles in all reſpects except the hinge; which in theſe is furniſhed with a great number of teeth, and in thoſe with but few. Pl. VI. fig. 9.

This family has not many ſpecies.

The rank the multarticulate Cockles hold in Liſter is Lib. iii. P. II. Sect. 2, cap. 2 and 3, or Pectunculi Leptopolyginglymi margine rotundâ. Woodward ranks them in Art. 2. of Sect. 1. of Claſs 5, alſo on the ſame account of their being of a roundiſh ſhape *(figura ſubrotundâ)*. Linnæus places them in his 312 genus of Arca; and the other authors have mixed them indiſcriminately with the articulate Cockles.

---

* De inſigni quodam Oſtreo, & Joſephi Montii de Oſtreo foſſili magnitudine & figura inſigni. Commentarii Inſtituti Bononienſis. Vol. II. P. I. p. 71. Vol. II. P. II. p. 339, cum fig.

Family 7. Arcæ, the Arks or Boats, ſuch as have their hinges on a perfect ſtrait line, and are of a ſomewhat ſquariſh figure or oblong; as the Noah's Arks and ſquare Cockles.

The rank the Arks hold in Authors is: Liſter puts ſome kinds among the multarticulate Cockles, Lib. iii. P. II. Sect. 2. cap. 1. and the Noah's Arks he places among the Muſcles, as many-toothed Muſcles, Ibid. Sect. 6. cap. 2. Woodward ranks them among his Polyginglymi formâ oblongâ, or with family 5. ſupra. Argenville places them in his fourth family, or of Heart Cockles; but Davila makes them a diſtinct genus of his fourth family, or Heart Cockles, and calls them Arks. Gualtieri forms a genus of them by the name of Concha Rhomboïdalis: and Linnæus and Meuſchen rank them as a diſtinct genus, and call them Arca.

This family has not many ſpecies.

To this family of Arks I imagine the foſſil *Hippocephaloidæ* belong, and that they are ſpecies of it, yet undiſcovered recent or living from ſea: my reaſon for ranking them with the Arks, and not the Cunei, is, that they appear to me to be multarticulate Shells.

Part II. Sect. 2. comprehends all Bivalves with equal valves, that are not eared, and have few teeth upon their hinge.

This ſection is extremely numerous, and very confuſed in authors. I ſhall therefore proceed firſt with the eighth family of Pectunculi or Cockles, whoſe character is a curved or ſemilunar hinge ſet with two to four ſtrong teeth. Pl. I. fig. 8, 9, 14. Pl. VI. fig. 8, 12. Pl. VII. 1, 2, 3, 10, 11.

This family of Cockles is ſo extremely numerous, and beſides has ſuch ſtriking or remarkable ſubordinate characters, that it can, with great propriety and eaſe, be divided into three genera, viz.

Genus 1. Pectunculi or Cockles, the Chamæ of ſome later authors. Pl. VII. fig. 1.

Genus 2. Cordiformes or Heart Cockles. Pl. I. fig. 8, 9. Pl. VI. fig. 8. And

Genus 3. Truncati or flat-ſided Cockles. Pl. VI. fig. 12. Pl. VII. fig. 10.

Genus 1. Pectunculi or Cockles. Shells convex or flattiſh, of a roundiſh ſhape, and with ſimilar or diſſimilar ſides; whoſe beaks are not very peaked or prominent, and curve, or turn much upwards towards the hinge; ſuch are the flattiſh Cockles, and many others. This genus is numerous.

Liſter intermixes them with my two following genera, all by the name of Pectunculi,

tunculi, and he has alſo placed ſeveral among his Tellens. Argenville, Davila, and Meuſchen call them Cames; and Davila divides them into four genera. Gualtieri alſo calls them Chamæ; and Linnæus diſperſes them into ſeveral of his genera.

Genus 2. Cordiformes, or Heart Cockles, are ſuch Cockles whoſe beaks are very prominent, and curve up greatly towards the hinge, thereby forming a figure perfectly like a heart, as vulgarly painted.

This genus is pretty numerous. Liſter intermixes them with the others. Argenville makes them his fourth family, Cœurs or Boucardes. It is alſo Davila's fourth family, who calls them Cœurs, and divides them into three genera, of which only the firſt is this my genus. They are the twenty-eighth genus of Meuſchen. Gualtieri places them among his Conchæ Cordiformes: and by Linnæus they are ranked in his Cardium genus.

Genus 3. Truncati or flat-ſided Cockles. Theſe are ſuch Cockles as are truncated, or have one ſide flat, and, as it were, cut off. Theſe ſpecies rank in moſt authors with the Cockles in general; and Davila only, to my knowledge, has made a particular or diſtinct genus of them: it is his third genus of Hearts, which he calls Cames Tronquées ou Conques de Venus. This genus is not very numerous.

Family 9, is the Tellinæ or Tellens; Shells more broad than long, rather flat, and the hinge has two teeth ſet cloſe together. Pl. VI. fig. 11, and 11. *b*.

This family may be divided into two genera, viz.

Genus 1. Tellinæ; Shells with ſimilar ſides, whoſe beak and hinge are central, Pl. VI. *f.* 11.

Genus 2. Cunei; Shells with diſſimilar or unequal ſides, whoſe beak and hinge are placed near to, or quite at one end.

Genus 1. Tellens. It is not very numerous in its ſpecies. The rank it holds in authors is as follows: Liſter places them after the Pinnæ. Lib. iii. P. 2. Sect. 8. and defines them Shells ſhaped like wedges. Woodward makes a genus of them, and ſays they have few teeth on the hinge, and are oblong Shells or with lengthened ſides: he might have expreſſed himſelf better by ſaying they were broad Shells. Rumphius, Gualtieri, Linnæus, and Meuſchen, have all a genus they call Tellina; Davila alſo, but he defines them very inaccurately, and includes the Solens as a genus of them. As for Argenville, he ranks them among the Muſcles.

In regard to the ſecond genus, or Cunei, they are intermixed by authors among the Tellens.

There are ſeveral kinds of foſſil Cunei, which remain yet undiſcovered recent or living from ſea; and ſome are very elegant and curious: as for example, the ſtudded kind, Pl. VI. fig. 5. the reticulated, and the ſulcated Cunei, &c.

Family 10. Placentæ; Shells with equal valves, whoſe hinge or cardo lies quite within the Shell, and in one valve conſiſts of two ſtrait linear ridges, pretty prominent, and laid obliquely to each other, ſo as to meet at one end in a very acute angle; and the other valve has two correſpondent furrows. Pl. VII. fig. 13.

I know of but two ſpecies of this genus, to wit, the *Chineſe Glaſs* or *Pellucid Oyſter*. Pl. VII. fig. 13. and the *Poliſh Saddle*.

I am the firſt who has formed this genus; for Liſter places the Glaſs Oyſter as an Eſcallop, Linnæus as an Anomia, and others as an Oyſter; and the Poliſh Saddle by all authors is ranked as an Oyſter.

I now proceed to Section 3, or thoſe Bivalves that are inarticulate, or have no teeth on their hinge; as the Margaritiferæ, Muſcles, &c. Pl. I. fig. 13. Pl. VII. fig. 9, 14, and 15.

Family 11. Margaritiferæ, or Pearl, Oyſters, are eared Shells with equal valves, and their hinge is meerly a gutter or ſlight furrow, without a ſingle tooth. Pl. VII. fig. 14.

The ſpecies of this family are few: they are the Mother of Pearl Shells or Pearl Oyſters, the Swallow, &c. I have made a diſtinct genus of them; but Liſter calls them Pearly Eſcallops: Rumphius, Davila, and Meuſchen, rank them as Oyſters. Woodward forms a genus he calls Margaritiferæ; and defines it as eared Shells with a ſmooth hinge; and Gualtieri defines them by placing the Pearl Shells in one genus, by the name of Conchæ Inæquilateræ; and the Swallow in another genus he calls Conchæ Aliformes.

The laſt and twelfth family of Bivalves with equal valves, is the muſcles; they are not eared; are moſt generally very convex, of a long and narrow ſhape, and the hinge is a meer ſlight furrow without any tooth, and is ſituated not at the top of the Shell, but a little way down one of the ſides.

The ſpecies are not many; and this genus is univerſally agreed upon by authors.

* * *

SECTION XIII.

I AM now come to Part III. *Conchæ Hiantes*, or Bivalves, whoſe Shells never ſhut cloſe, but are always open or gaping in ſome part.

This part conſtitutes the thirteenth family, and conſiſts of four genera, to wit,

Genus 1. Tridacnæ, or Baſon Conques.
Genus 2. Chamæ, or Gapers.
Genus 3. Solens, or Sheaths: and
Genus 4. Pinnæ, Sea Wings, or Hams.

Genus 1. Tridacnæ, or Baſon Conques. Shells of equal valves and diſſimilar ſides, in hinge and appearance like the Heart

Cockles, but on the longeſt ſide, from the beak to near the extreme margin, the two Shells do not cloſe, but leave a large oval or heart-like gap or opening, the lips whereof are very broad, and turn up on the edges. Pl. VII. fig. 4, 5 *.

Theſe are the Baſon Conques, &c. of which there are few ſpecies: but they are the largeſt and heavieſt Bivalves yet known, ſome weighing from three hundred and a half to ſix or ſeven hundred weight.

Genus 2. Chamæ, Purrs or Gapers. The Chamæ have a broad, thick, and large tooth for their hinge, and are, as it were, abruptly cut off on one ſide, which ſide is always open or gaping, as the valves

---

* I think ſome diſtinction ſhould be made between theſe and the Chamæ. The Apertures in the firſt are meerly to tranſmit a *fine tentaculum*, to prevent their being daſhed to pieces by the rocks and waves. The *Hiatus* in the Chamæ is for a very different purpoſe, to permit the fiſh to extend itſelf in ſearch of food, and immediately to retire in caſes of danger.

cannot ſhut cloſe at that part. Pl. VII. fig. 16.

The name of Chama, notwithſtanding its ſignification of a gaping or open body, has of late years been very erroneouſly applied to Shells which always ſhut cloſe, as the Cockles, &c. *

There are very few ſpecies of this genus.

Genus 3. Solenes, Sheaths, or Razor Shells. Theſe are very broad, though extremely ſhort. They are open at both ends; and the hinge has teeth placed quite at one end. Pl. VII. fig. 8.

There are very few ſpecies of this genus.

Genus 4. Pinnæ, Sea Wings or Hams. The Pinnæ are Shells of a ſomewhat tri-

---

* Chamæ à Græcis Χύμαι nominatæ ſunt ab hiando, propterea alii illas etiam *Hiatulas* vocarunt.

angular ſhape, widening from a pointed or narrow top to a very broad end, which broad end is always open. The hinge is inarticulate, and is placed on one ſide.

The ſpecies of this genus are few.

◆ ◆ ◆

SECTION XIV.

THE third general diviſion of teſtaceous animals is the Multivalves, or thoſe Shells that are made up of many valves or pieces. There are three families in this diviſion, viz.

Family 14. Pholas, or Piddocks.

Family 15. Anatiferæ, or Barnacles: and

Family 16. Balani, or Acorns.

Family 14. Pholas or Piddocks. Theſe Shells are trivalves, and have two large valves, with a ſmall valve placed between them, near to the hinge. The hinge turns up on the outer part of the Shell, and under it, within the Shell, is a long curved tooth or ſpur. Pl. VII. fig. 17.

The ſpecies of this family are very few.

Family 15. Anatiferæ or Barnacles. Theſe Shells are quinque-valves, and are made up of two large valves with two ſmall ones beneath them, and a long narrow ſpur-like valve, which connects them, and runs lengthwiſe. Pl. I. fig. 11. *m.* The neck or cartilage it hangs by. *o* The ſpur-like valve; and *p*, the ſmaller valves.

There are but few ſpecies of this family.

The Latin name *Anatifera* was given them from the fabulous ſtory of their becoming geeſe; as was alſo the Engliſh name *Barnacle* from the ſame origin, as thoſe birds they were ſuppoſed to breed were the *Barnacles* or *Brent Geeſe.*

The ſixteenth and laſt family of Shells is the Balani or Acorns. The Balani are made up of many valves lying parallel to each other, and in a perpendicular poſition, contrary to the poſition of all other valves, which lie horizontally. The top is open, and the fiſh performs its neceſſary functions by that aperture; for the valves never open or ſeparate, as they have no hinges. The bottom is the part by which they affix themſelves to other bodies; for the Balani are never found looſe, or otherwiſe than affixed to ſhells, ſtones, and other ſolid bodies. Pl. I. fig. 12. Pl. VII. fig. 6, 7.

There are few ſpecies of this family.

There is another ſet of marine animals called *Oſcabiorns*, which though their covering is like Shells, yet I cannot agree to rank them as teſtacea, for I think, like the Echini, they are genera of cruſtaceous animals. However, Argenville, Adanſon, Linnæus, and Davila, rank them with Shells; I ſhall nevertheleſs keep to my opinion for the preſent, and paſs them over with only obſerving, that, if the collector thinks they are teſtacea, with the authors above quoted, the rank they will hold is in this diviſion, and that they will form a ſeventeenth family.

EXPLANATIONS OF PLATES.

PLATE I.

Fig. 1. PATELLA vulgaris, the common Limpet in profile, to ſhew the ſimple Univalves. *l.* the eye or apex.

2. Inſide of the ſame in full view.

3. Buccinum Vulgare Anglicum, the common Engliſh Whelk in full view, or on the ſide of the aperture.

4. The ſame on the back part.

5. The ſame cut open to ſhew the interior ſtructure. *a.* The body. *b.* A ſingle wreath. *c.* The turban, or aſſemblage of wreaths. *d.* The Columella or pillar; and *h.* The beak, or roſtrum.

VI.

6, 7. A Spider Shell, or Aporrhais, in full view, and on the back part. *a a.* The body. *b.* A wreath. *c.* The turban or clavicle. *e. f. g.* The lip. *h.* The roſtrum, beak, or top. *i. i.* The ſinus or ſcoop. *k.* The prongs, or claws.

8, 9. A large Cockle, ſhewn inſide and outſide, to exhibit Bivalves of equal valves, and that always ſhut cloſe.

10. Two *opercula*, or lids of Univalves; the largeſt is the *Blatta Byzantia.*

11. An Anatifera, or Barnacle, a Quinquevalve. *m.* The neck, or griſtly appendage to which the Shell is affixed. *o.* The long, narrow, ſpur-like Shell, that is the fifth valve, and lies in a tranſverſe poſition to the other four valves, of which *p.* are the two ſmaller.

12. A group of common Balani, or Acorn Shells, which are Multivalves.

13. Cardo Edentulus of a Bivalve. An inarticulate hinge, or without any teeth.

14. Cardo paucis dentibus. A hinge ſet with few teeth.

15. Cardo dentibus numeroſis ſeu polygymon. A multarticulate hinge, or ſet with numerous teeth.

PLATE II.

Fig. 1. PATELLA *Oculus Hirci.* The *Goat's Eye* Limpet, taken from the anonymous new Conchology. Tab. 2. fig. 6. p. 11. N°. 6.

2. Patella Concamerata. A chambered Limpet from ditto. Tab. 6. fig. 1. ſhewn inſide and outſide.

3. A Maſk Limpet from Falkland iſland, from ditto. Tab. 7. fig. 5.

4. An Auris Marina, or Sea Ear.

5. A chambered Vermiculus, taken from Davila's Catalogue, Tome I. Pl. 21.

6. A group or cluſter of common Vermiculi, from annoymous new Conchology. Tab. 10. fig. 17.

Fig. 7. A ſingle Vermiculus, or Worm-tube, from anonymous new Conchology. Tab. 10. fig. 15.

8. Penecillus. The *Watering-Pot.*

9. The green ſulcated Indian Dentale, or *Elephant's Tooth.* New Conchology. Tab. 12. fig. 12.

10. The common ſmooth Engliſh Dentale, from ditto. Tab. 10. fig. 3.

11. A Turbo Concameratus, in the foſſil ſtate, or a ſtone-caſt.

12. A recent Orthoceratites from the ſhores of Rimini, in the Adriatic Sea, cut open, and greatly magnified. From Gualtieri Index Conchyliorum.

13. Shews the Shell of its natural ſize, from the ſame author.

14. Fragment of a foſſil Orthoceratites, in which the chambers and the ſiphunculus are diſtinctly ſhewn; from Breynius de Polythalamiis. Tab. 6. fig. 1.

15. An Ammonoides foſſil.

16. The Pearly Chambered Nautilus, or Sailor, and

17. The ſame Shell cut open, to ſhew its internal chambered ſtructure.

18. The Lituus or Rams Horn, and

19. The ſame Shell cut open, to ſhew its internal chambered ſtructure.

20. An Ammonites foſſil, and

21. The ſame laid open, to ſhew its internal chambered ſtructure.

PLATE III.

Fig. 1. A *COWRY* on the upper ſide. Cyprea.

2. The ſame Shell on the under ſide, to ſhew the mouth or aperture.

3. The *Weavers Shuttle*, Semiporcellana.

4. A *Dipper*, ſhewn on the aperture or under ſide. Nux.

5. The ſame on the upper ſide.

6. The *Paper Nautilus*, Cymbium.

7. *Venus Ear*, on the upper ſide.

8. The ſame Shell on the under ſide, or ſhewing the mouth or aperture.

9. Cochlea Strombiformis, ſive Clavicula longiſſima.

Fig. 10. Cochlea Helix vel depreſſa.

11. Cochlea Clavicula depreſſiore, vel breviore.

12. Turbo ſive Cochlea clavicula productiore. The *Snake.*

13. A Trochus.

14. The *Magpye* Nerit, Nerita on the upper ſide.

15. The ſame Shell ſhewn on the under or mouth-ſide.

PLATE IV.

Fig. 1. THE *Furbelow* from Falkland Iſland; Buccinum *Fimbriatum.* A Buccinum of the *canaliculated* kind.

2. The *Grimace.* A Buccinum of the *recurviroſtrum* kind.

3. The *Tiara* or *Papal* Crown. A Buccinum of that kind with the *Pleated Pillar*; *Columella Dentata.*

4. The *Crane.* A Buccinum of the *longiroſtrum* kind.

5. The *Thorny Woodcock.* A *Purpura*, and of the *longiroſtrum* kind.

6. The *Joppa Whelk.* A Buccinum of the *umbilicated* kind.

Fig. 7. A Strombus or *Needle.*

8. A curious knobbed *Tun*, Globoſa.

9. A *Melon Tun*, Globoſa.

10. A *Helmet*, Caſſis, ſhewn on the under or mouth ſide.

PLATE V.

Fig. 1. A MUREX of the Alata genus. A kind of *Plough.*

2. A Murex of the Rhombus genus.

3. A Volute. A kind of *Admiral.*

4. The *Panama* or *Camp*. An Olive or Cylindar.

5. A Murex. The *Devil.*

6. A Purpura, called the *Skeleton.*

7. An Olive or Cylindar.

8. A *flamboyante* Volute.

9. Another Volute. A kind of *Admiral.*

PLATE VI.

Fig. 1. THE *Ducal Mantle* Eſcallop. Fig. 1. *a.* ſhews the inſide top or the hinge of the Shell.

2. The foſſil Oyſter, found at Heddington in Oxfordſhire. A ſpecies yet undiſcovered recent or living. Fig. 2. *a.* ſhews the inſide top or hinge.

3. The Anomia *Terebratula*, only of late years diſcovered recent or living. Fig. 3. *a.* the top or hinge part of the ſhell.

4. A Spondyle, vulgarly called the *Thorny Oyſter*. Fig. 4. *a.* the inſide top or the hinge.

5. The ſtudded Cuneus, a foſſil, of which the living ſpecies yet remains undiſcovered.

6. A Pectinoides.

Fig 7. The bottom valve of a ſpecies of Anomia lately diſcovered living, and ſhews the inſide with the griſtly appendages of the animal, taken from Davila's Catalogue. Vol. I, Pl. xx. fig. *a.*

8. A Cardium or Heart-Cockle, the *Strawberry.*

9. A Polyginglymon or Multarticulate Cockle.

10. A Polyginglymon or Multarticulate Anomia, foſſil, of which the living ſpecies ſtill remains undiſcovered.

11. The *Tulip* Tellina, fig. 11. *b.* ſhews the inſide top or hinge.

12. The *painted Cockle*, of the truncated or flat-ſided kind.

PLATE VII.

Fig. 1. A PECTUNCULUS ſhewn on the inſide.

2. 3. And in two ſide views. *a. a.* the ſummit. *b. b. b.* the beaks. *c. c. c.* the margins or borders. *d. d.* the length of the ſhell. *e. e.* the breadth of the ſhell. *f. f. f.* the ſlopes.

4. A Tridacna, the *Baſon Conch* or *Clamp.*

5. The inſide top or the hinge part of the ſaid Shell.

6. A Balanus or *Acorn* Shell. A Multivalve.

7. The ſame cut open to ſhew its interior ſtructure.

Fig. 8. Solen, the *Sheath*, *Razor Shell* or *Spout-Fiſh*. A Shell of equal valves, but that never ſhuts cloſe; a *Concha hians*; the line *d. d.* ſhews its length, and *e. e.* its breadth.

9. The Common Muſcle. A ſpecies of the Shells with inarticulate hinges.

10. The *Bears Paw*, of the kind of flat-ſided Cockles.

11. The inſide top or hinge part of the ſaid Shell.

12. The *Pearl River Muſcle* ſhewn of the inſide.

13. The *Glaſs* or *Chineſe pellucid Oyſter*, of the Placenta family, an inſide view to ſhew the hinge.

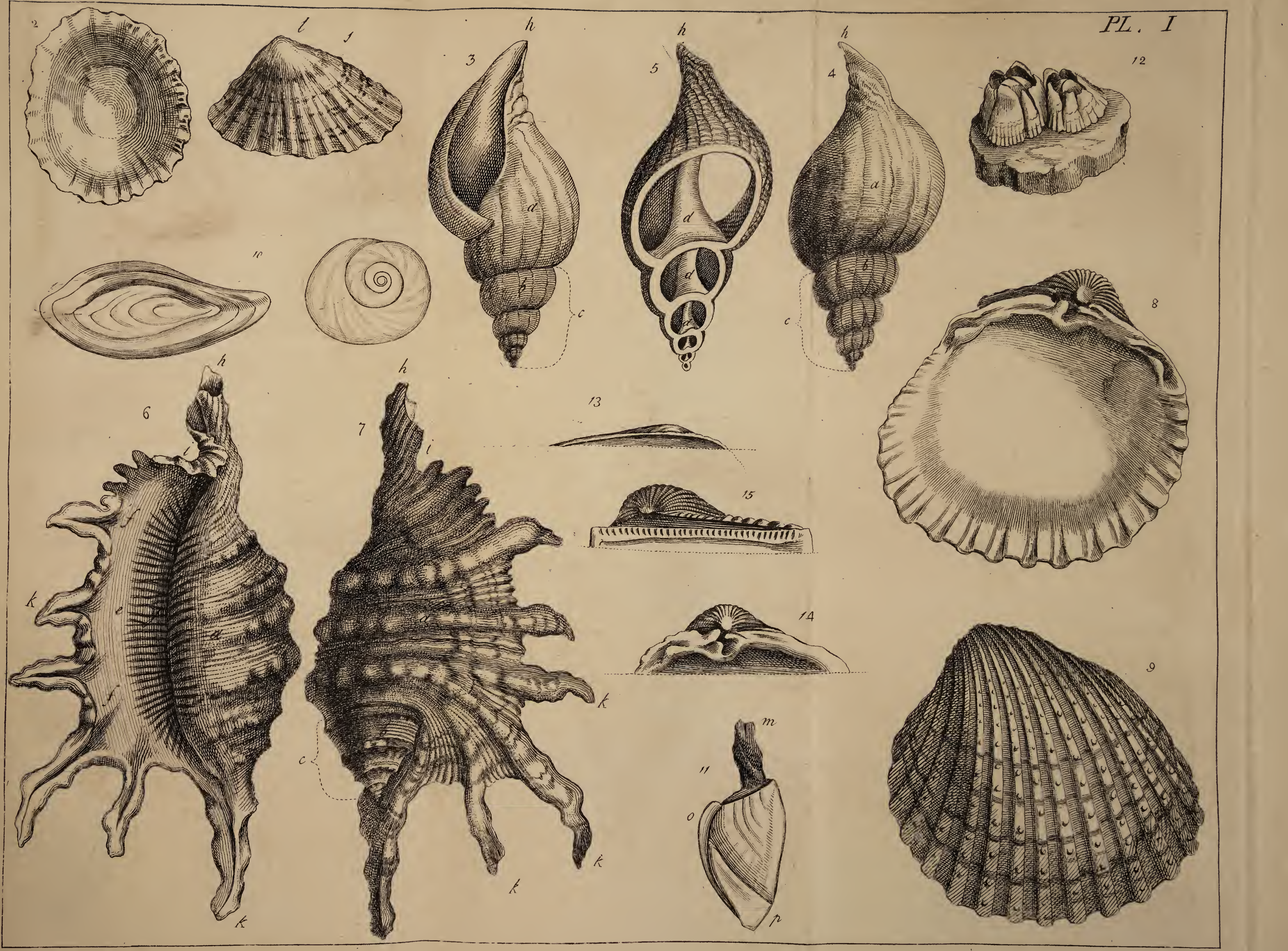
14. The *Pearl Oyſter* of the Margaritifera family, an inſide view to ſhew the inarticulate hinge.

Fig. 15. Another figure of an inarticulate hinge.

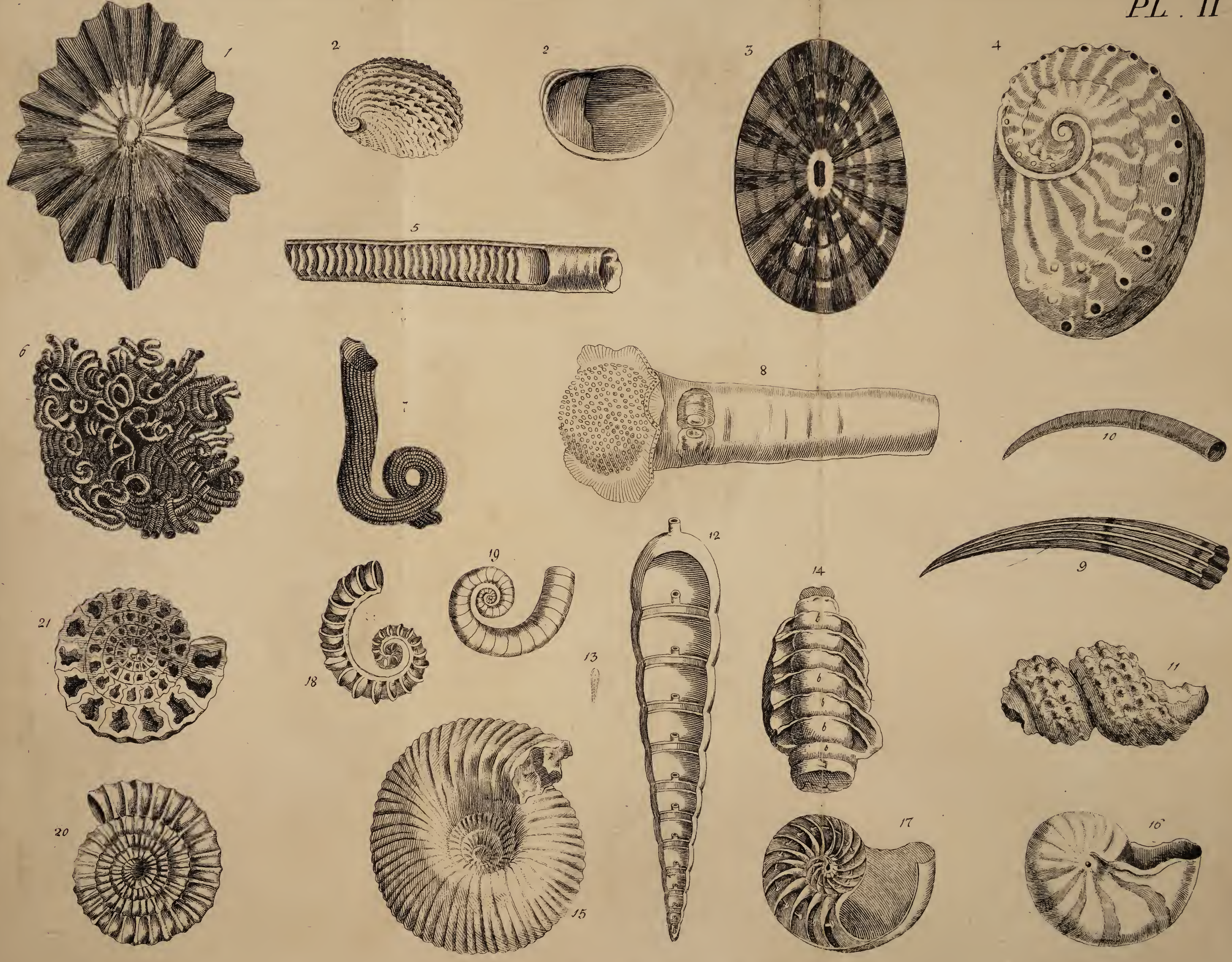
16. A *Chama* Pholas, the *Spoon-hinge*, ſhewn on the inſide, and is a *Concha hians*, or a Shell that never ſhuts cloſe, but is always *open* or *gaping* at one end.

17. The *Spur* Pholas, alſo ſhewn on the inſide.

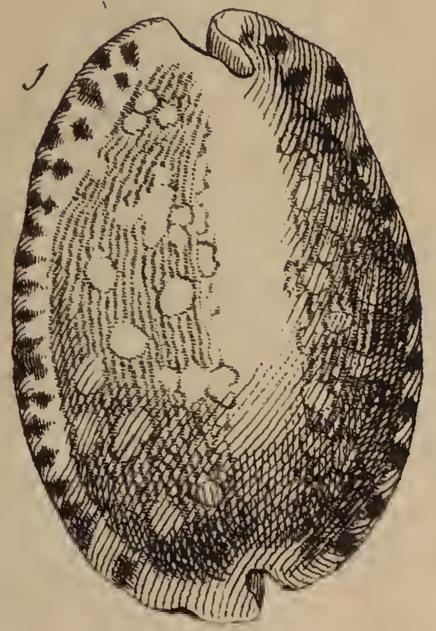
PL. I

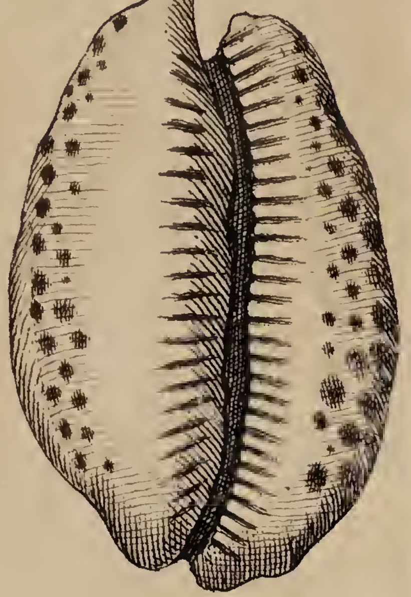


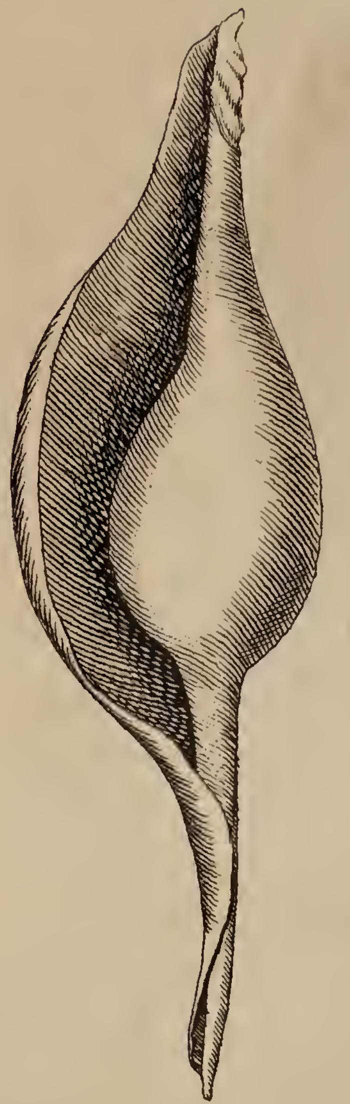
PL. II

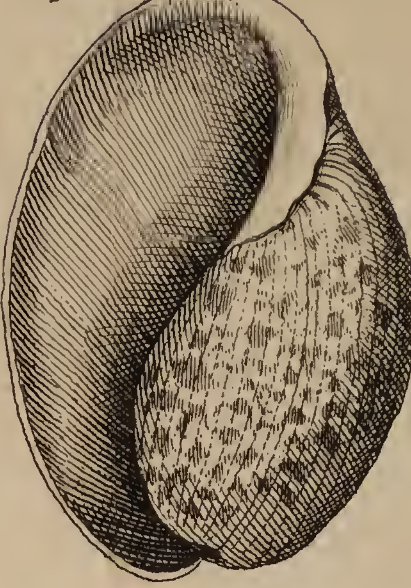


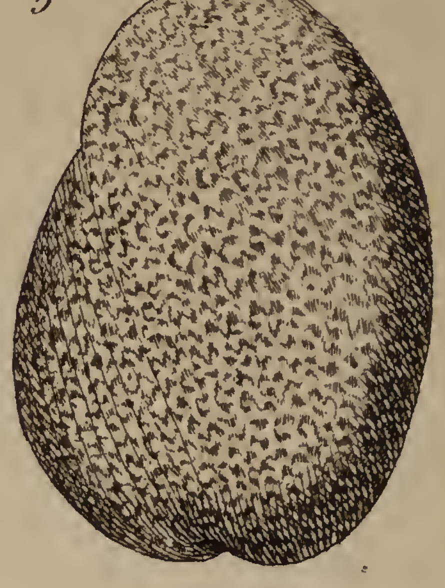
PL. III

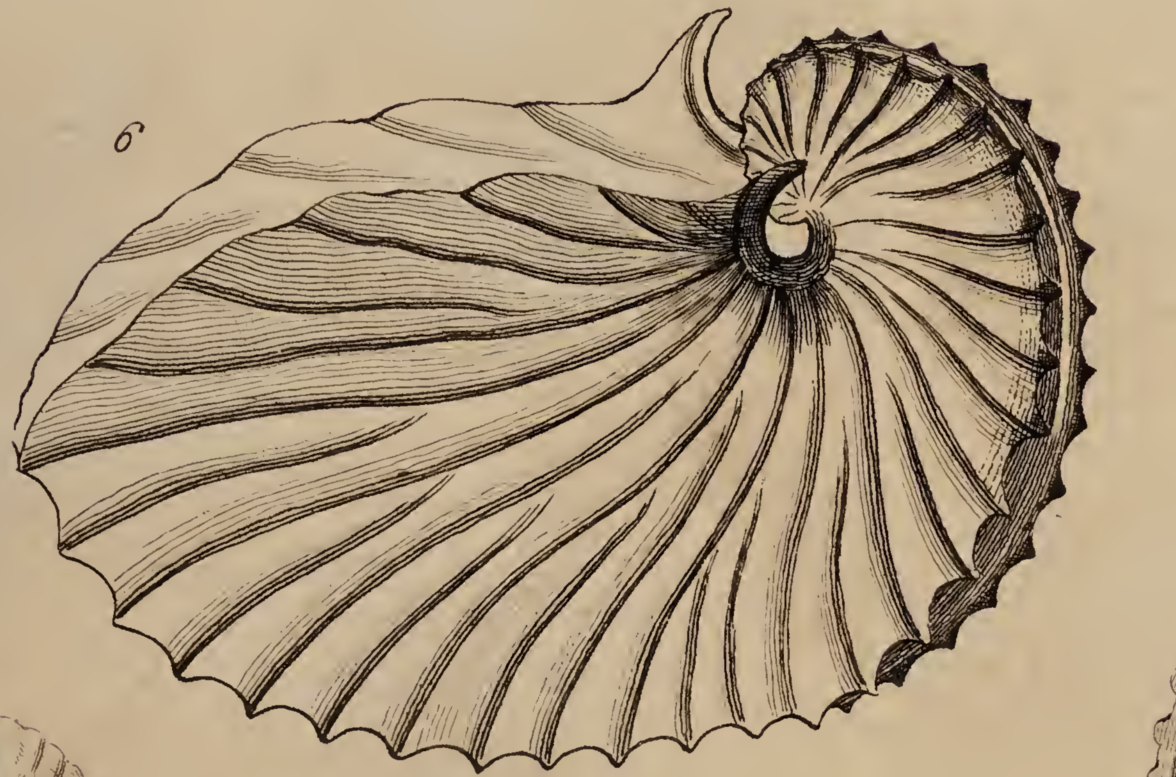
1


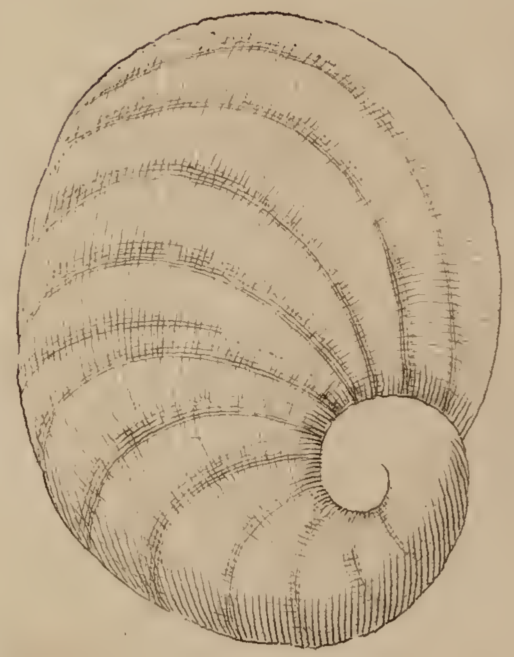
2


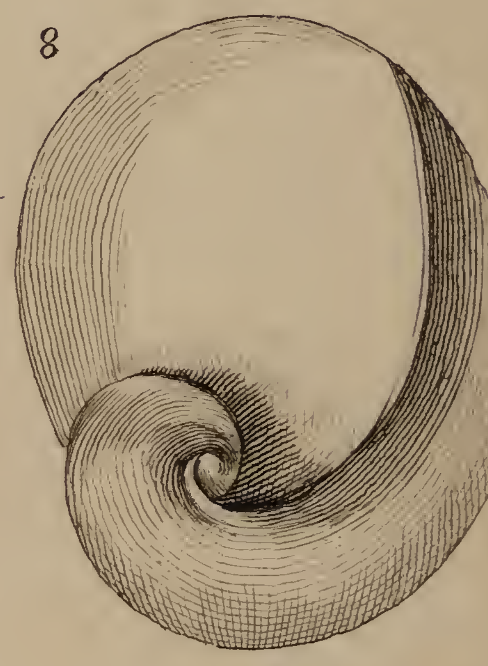
3


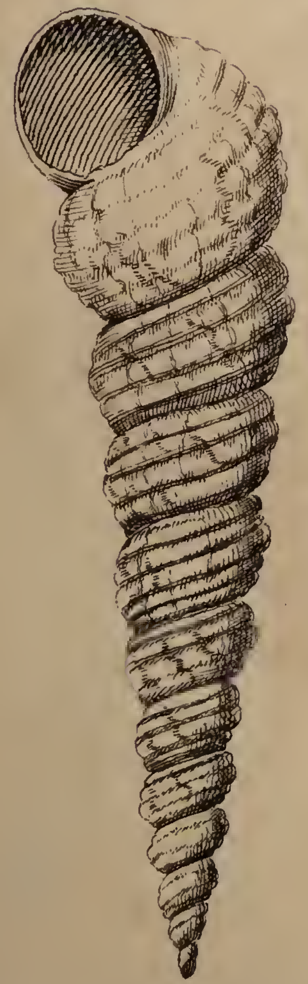
4


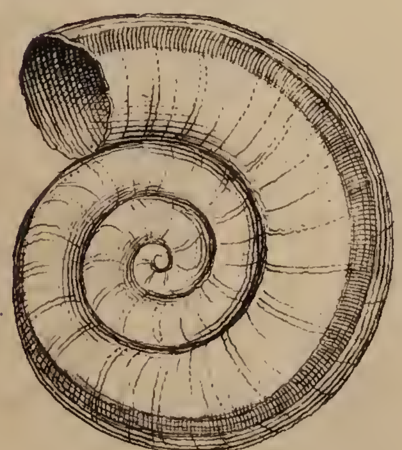
5


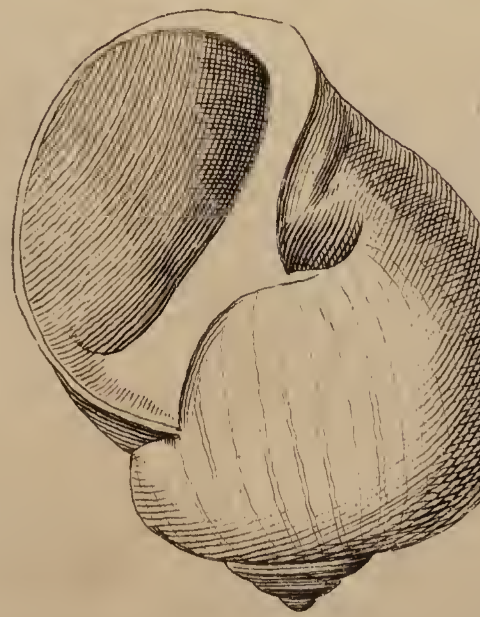
6


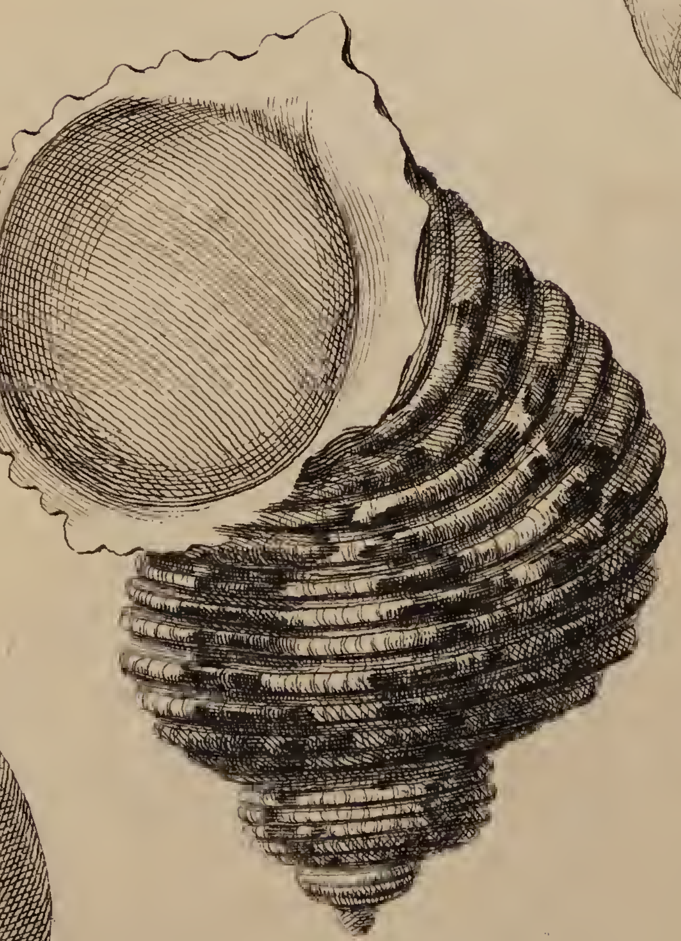
7


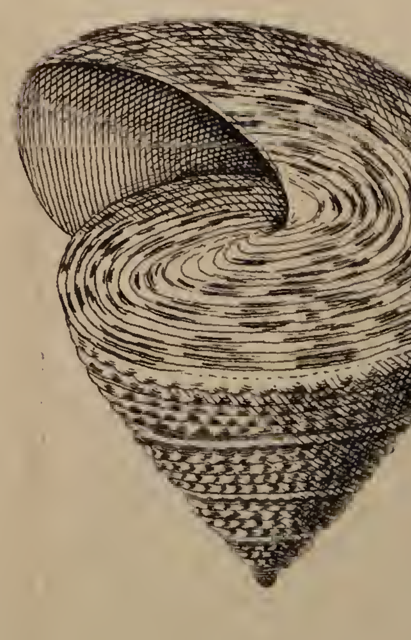
8


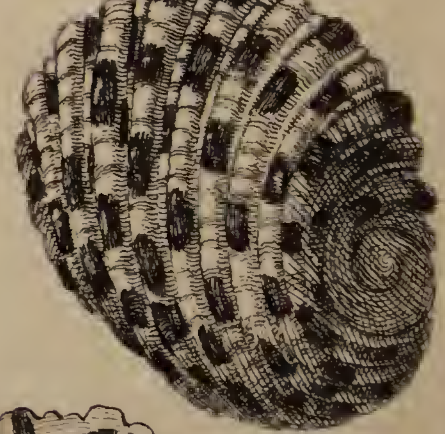
9


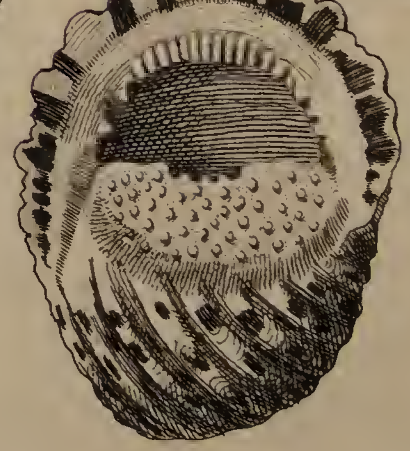
10


11


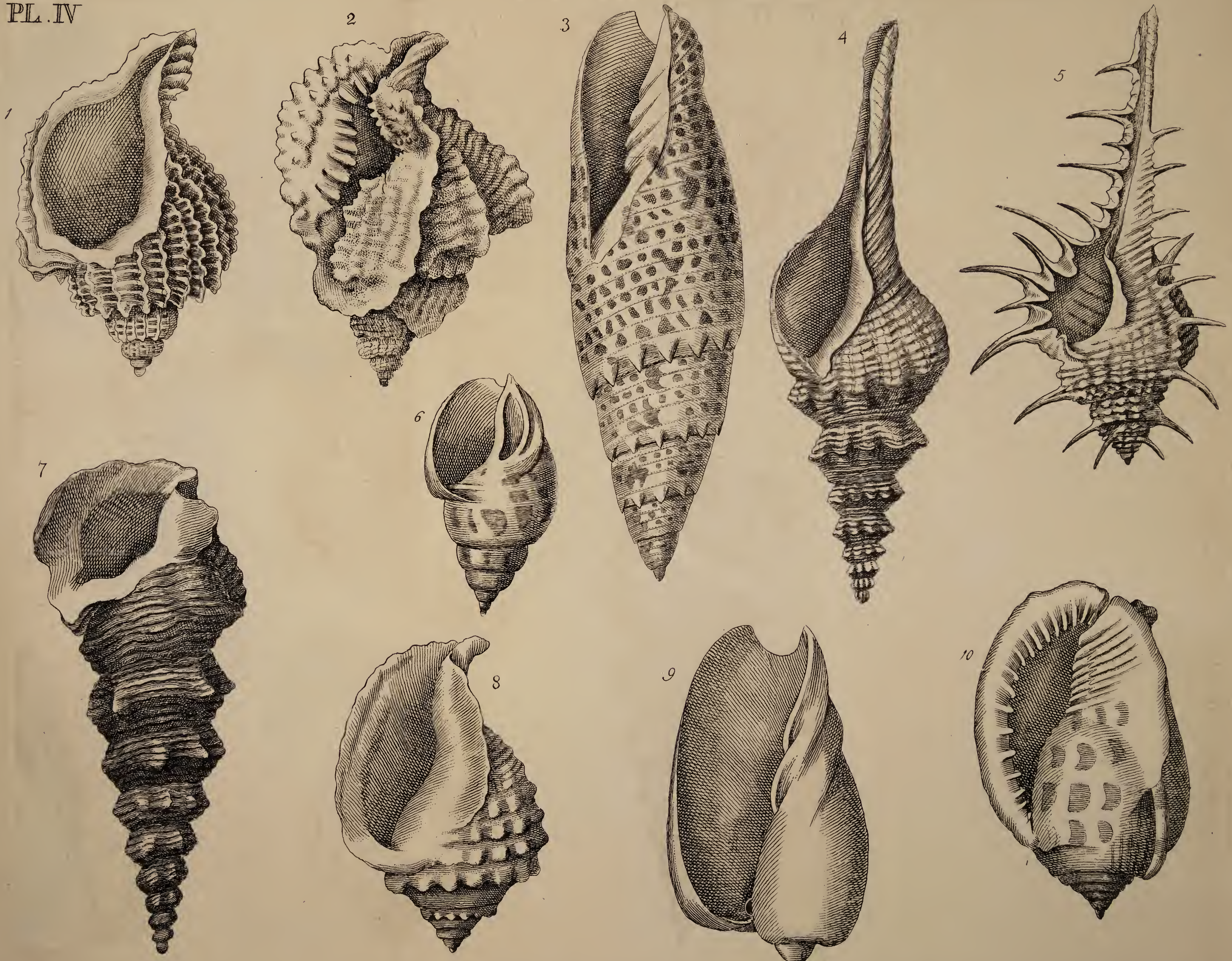
12


13


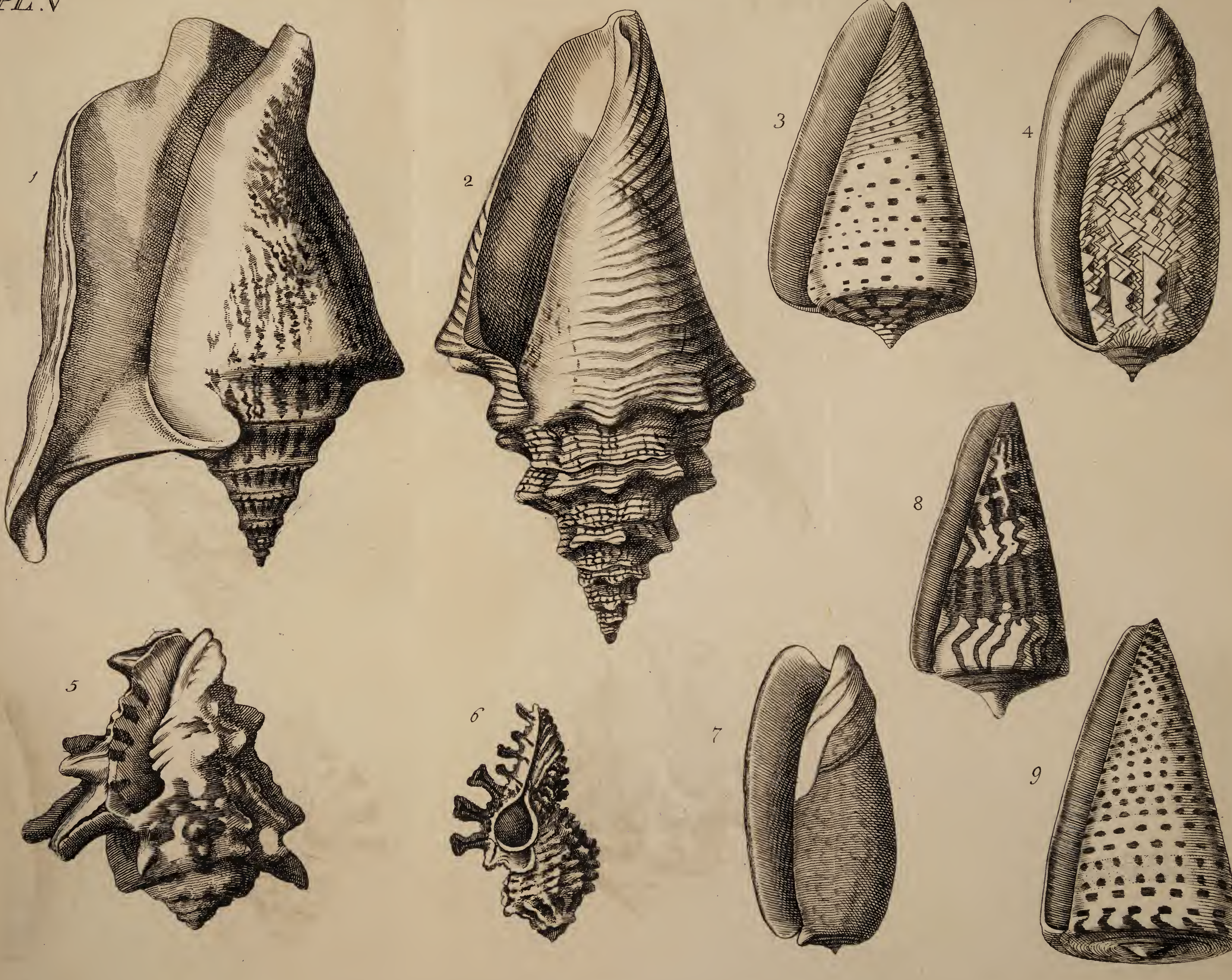
14


15


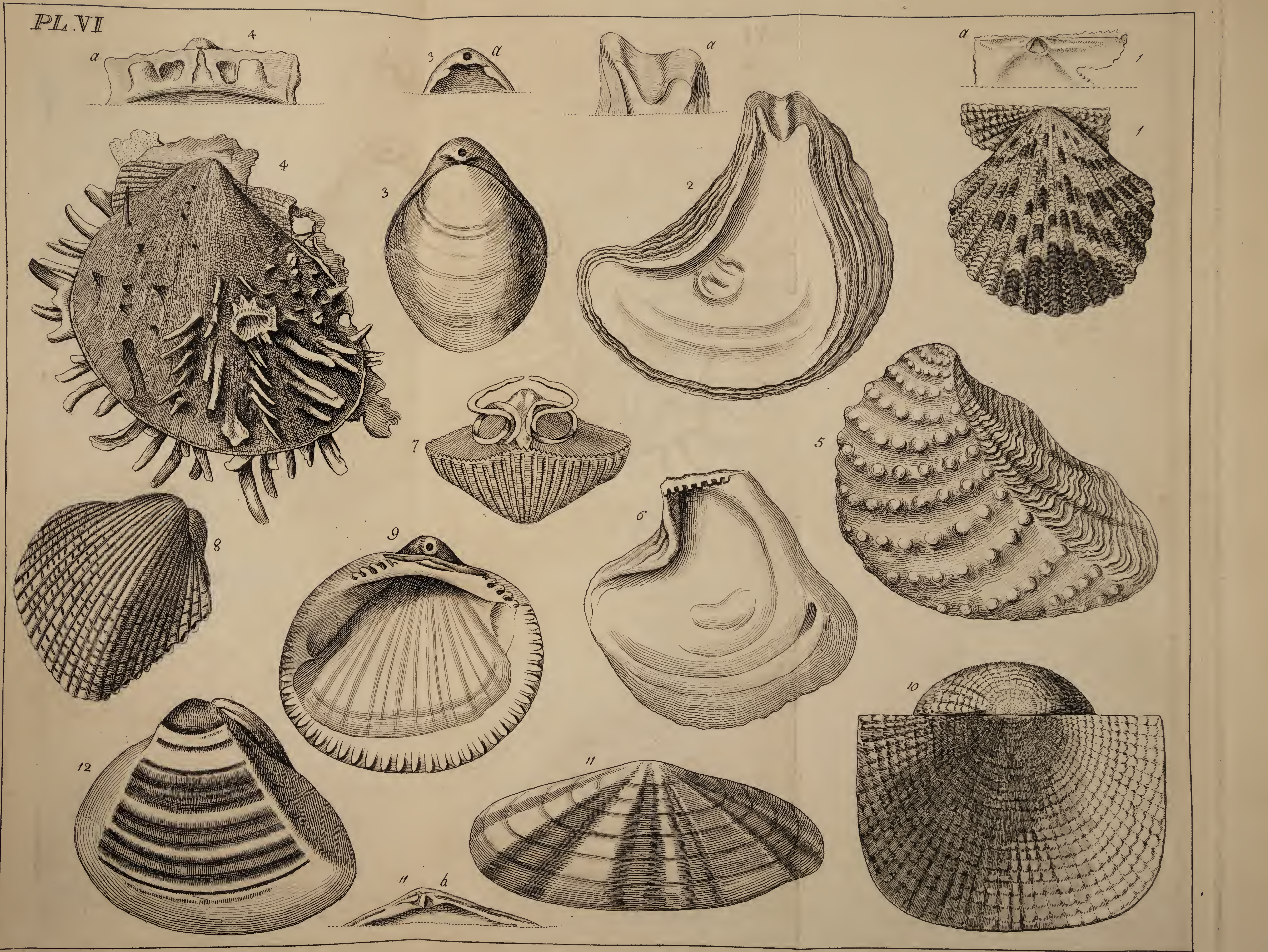
PL. IV



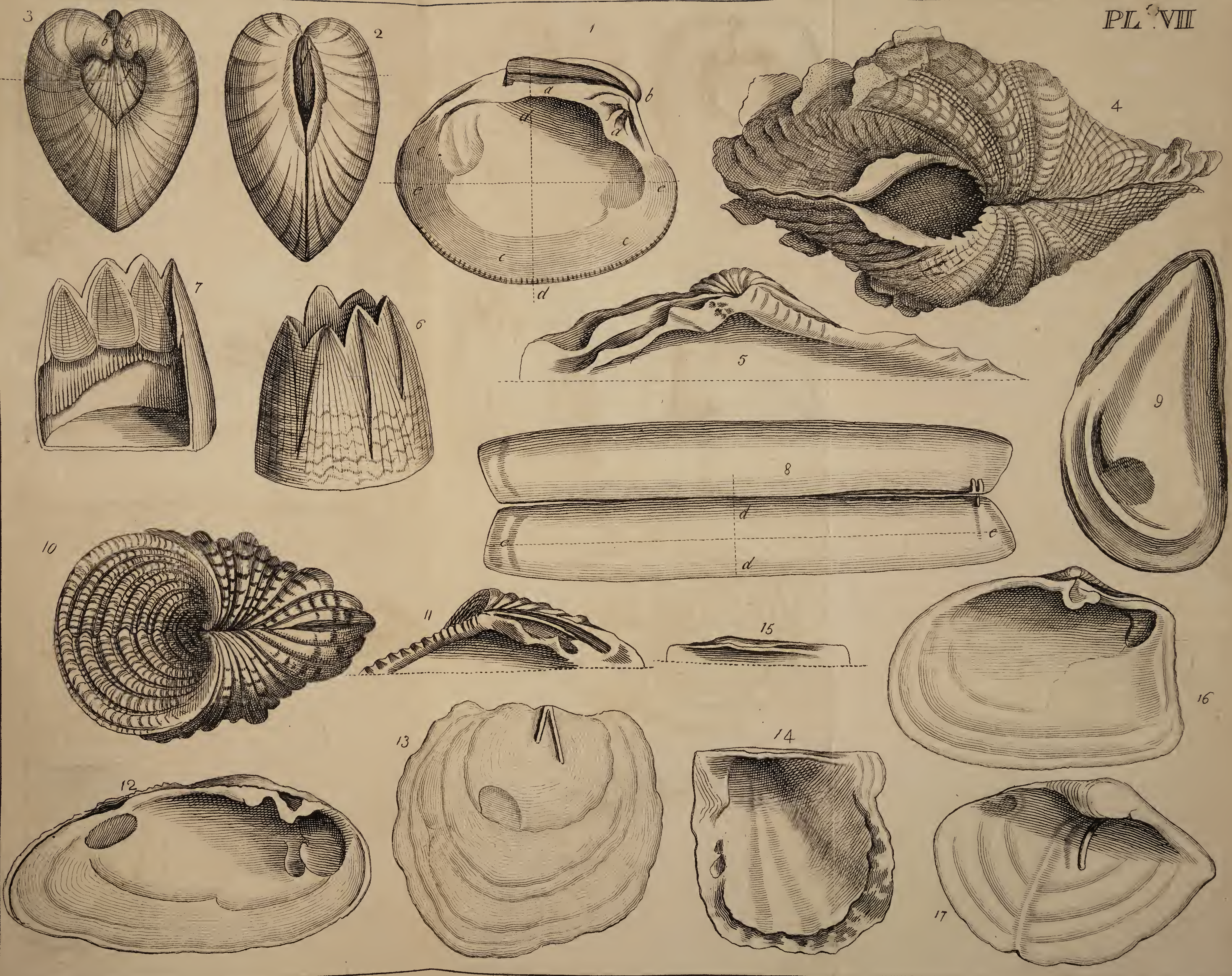
PL. V



PL. VI



PL. VII



TABULA SYNOPTICA TESTACEORUM. I. UNIVALVIA.

Teſtaceous Animals rank under Three general Diviſions; viz. I. Univalves. II. Bivalves. III. Multivalves.

DIVISION I. UNIVALVES have Four Orders or Subdiviſions. I. Simple. II. Chambered. III. Revolved; and IV. Turbinated, or Spiral.

ORDER I. Simple, or no-wiſe Spiral.

Fam.		Genus.
I.	Patella. Limpets.	1 Vertice integro, whole Limpets.
		2 Concamerata, chambered Limpets.
		3 Vertice perforato, Maſks.
II.	Haliotis.	4 Sea Ears.
III.	Vermiculi.	5 Worm Shells.
		6 Penecilli.
IV.	Dentalia.	7 Teeth.

ORDER II. Polythalamia, or Chambered.

Fam.		Genus.
V.	Polythalamia.	8 Orthoceros. Horns.
		9 Lituus. Croziers.
		10 Turbinoides.
		11 Ammonia. Snakes.
		12 Ammonoides.
		13 Nautili. Sailors.

ORDER III. Revolved.

Fam.		Genus.
VI.	Turbinata involuta.	14 Nuces ſive Bullæ, Dippers.
		15 Semiporcellana.
		16 Cyprea vel Porcellana. Cowries.

ORDER IV. Turbinated, or Spiral.

Fam.		Genus.
VII.	Cymbium.	17 Paper Nautilus.
VIII.	AurisCochlea.	18 Venus Ear.
IX.	Cylindri.	Olives, or Cylindars.
		19 Emarginati.
		20 Marginati.
X.	Voluta.	21 Volute.
XI.	Globoſa.	22 Tuns.
XII.	Caſſides.	23 Helmets.
XIII.	Trochi.	24 Tops.
XIV.	Cochleæ.	Snails.
		25 Nerits.
		26 Helices.
		27 C.Clavicula breviore.
		28 Turbo.
		29 Strombiformes.
XV.	Buccina.	Whelks.
		30 B. Canaliculata, guttered. *W.*
		31 B. Recurviroſtra, wry-mouthed, *W.*
		32 B. Longiroſtra, vel roſtrata, beaked. *W.*
		33 B. Umbilicata, umbilicated. *W*
		34 B. Columella plicata. *W.* with a pleated pillar.
		35 Strombi, Needles.
XVI.	Murex.	Rocks.
		36 Murex. Rocks.
		37 Rhombi. Lozenges.
		38 Alata, Winged Rocks.
		39 Aporrhaïdæ, Fingered Rocks, or Spiders.

TABULA SYNOPTICA TESTACEORUM. II. & III. BIVALVIA and MULTIVALVIA.

DIVISION II. BIVALVES have three Orders or Subdiviſions.

I. With unequal Valves, and ſhut cloſe. II. With equal Valves, and ſhut cloſe; and, III. With Valves that never ſhut cloſe.

ORDER I. With unequal Valves, and ſhut cloſe.

FAM.		GENUS.
I.	Pecten. - - -	1 Eſcallops.
II.	Spondylus. - -	2 Spondyles.
III.	Oſtreum. - - -	3 Oyſter.
IV.	Anomia. - - -	Anomia.
		4. A. Inarticulate.
		5. A. Multarticulate.

ORDER II. with equal Valves, and ſhut cloſe.

Sect. I. Leptopolyginglymi, or Multarticulate.

FAM.		GENUS.
V.	Pectinoides. - - - - - -	6 Pectinoides.
VI.	Pectunculi Leptopolyginglymi.	7 Multarticulate Cockles.
VII.	Arca. - - - - - - - -	8 Ark, or Boat.

SECT. II. Articulate, or ſet with few Teeth.

FAM.		GENUS.
VIII.	Pectunculus. - - - - -	Cockles.
		9 Cockles.
		10 Cardium, or Heart Cockles.
		11 Truncatus, or flat-ſided Cockles.
IX.	Tellina. - - - - - -	Tellens, or Sand Muſcles.
		12 Tellens.
		13 Cuneus.
X.	Placenta. - - - - - - -	14 Placenta.

SECT. III. Inarticulate, or without any Teeth.

FAM.		GENUS.
XI.	Margaritifera. - - - - - -	15 Pearl Oyſter.
XII.	Muſculus. - - - - - - -	16 Muſcles.

ORDER III. with Valves that never ſhut cloſe. Conchæ Hiantes.

FAM.		GENUS.
XIII.	Chama, Gapers. - - - -	17 Tridacna, Baſon Conques, or Clamps,
		18 Chama, Purrs.
		19 Solen, Sheath, or Razor Shell.
		20 Pinna, Sea-Wing, or Ham.

DIVISION III. MULTIVALVES.

FAM.		GENUS.
XIV.	Pholas. - - - -	21 Piddocks.
XV.	Anatiferæ. - -	22 Barnacles.
XVI.	Balani. - - - -	23 Acorns.

INDEX.

A.

Acorns. See Balani.

Adanson, 12, 20, 46, 91.

Admirals. See Volutes.

Æquilateræ. See Margins.

Alata, 22, 118, 225, 229.

—— foſſil, 230.

Aldrovandus, 57.

Alveoli, 157.

Ammonia, 154, 161.

Ammonoides, 154, 167.

Anatifera, 278, 279.

Anfractus. See Whirl.

Anomia, 251.

Anonymous, 51.

Apertura, or aperture, 116, 133.

Apex.

Apex. See Head and Summit.

Aporrhais, 225, 230.

Appendix. See Prongs.

Arca. See Arks.

ARGENVILLE, 28, 39, 87, 235.

Argonauta. See Cymbium.

ARISTOTLE, 57.

Arks, 265.

Aſtrolepas. See Limpet.

Auris Cochlea, 187.

Auris Marina. See Haliotis.

B.

Balani, 98, 278, 279.

Barnacles. See Anatifera.

Baſon Conchs. See Tridacna.

Beak, 116, 240.

Beards. See Bivalves.

Beauty. See Limpet.

BELLONIUS, 57.

Bilinguia. See Buccina.

Bivalve, definition of, 132, 133, 232.

——— Syſtem of, 233.

——— of unequal valves and ſhut cloſe, 233, 244.

——— of equal valves and ſhut cloſe, 233.

Bivalve of equal valves that never ſhut cloſe, 233, 274.
——— with an articulate hinge, 262, 266.
——— with a multarticulate hinge, 262.
——— with an inarticulate hinge, 262, 272.
——— not ſo numerous and beautiful as Univalves, 231, 243.
——— land ones none, 243.
——— breadth and length of them, 241.
——— beards of, 63.
Blatta Byzantia. See Operculum.
Bloody Tooth. See Nerit.
Boats. See Arks.
Body of an Univalve, 113.
Borders. See Margins.
Boucardes. See Cockles Cordiformes.
BREYNIUS, 55, 93, 235.
Brocades. See *Volute.*
Buccina, 70, 207.
——— Ampullacea. See Globoſa.
——— Bilinguia, 229.
——— Canaliculata, 210, 212.
——— Columella dentata, 211, 215.
——— foſſil, 223.
——— heteroſtrophon foſſil, 223.
——— plagioſtoma, vel recurviroſtra, 210, 212.

Buccina, roſtrata, 211, 214, 219, 220, 221.
——— Strombi, 212, 217.
——— Umbilicata, 211, 215.
Bulla, 173.
BUONANNI, 24, 38, 238.
Bure de, 27.
Byſſus, 62.

C.

CALCEOLARIUS, 57.
Cames. See Cockles.
Camp. See *Olives.*
Canaliculus. See Furrow.
Cardium. See Cockles Heart.
Cardo. See Hinge.
Cartilage, Cartilago, 243.
Caſſides, 195.
Cedo nulli, 192.
Chama, 274, 275.
Claws, 117.
Clavicula, or Clavicle. See Turban.
Cochlea, 198.
——— Conoides. See Volutes.
——— Lunares, 204.
——— Semi-Lunares, 200.

Cochlea, Valvatæ, 299.
——— Nerites, 198, 199.
——— Helices, 199, 201.
——— Clavicula breviore, 199, 202.
——— Turbo, 199, 203.
——— Strombiformes, 199, 205.
——— Pyriformes. See Figs.
——— Cylindroïdeæ. See Cylindri.
——— foſſil, 207.
——— See Snails.
Cochlidium. 94.
Cockles, 266.
——— articulate, 266, 267.
——— multarticulate, 264.
——— Heart, or Cordiformes, 267, 268.
——— truncated or flat-ſided, 267, 269.
——— ſquare. See Arks.
Cockſcomb. See Oyſter.
Columella. See Pillar.
COLUMNA, 6, 7. 53.
Compaſs. See Eſcallop.
Concha, 94.
Conchoides, 94.
Conchology, ſtudy of, 1, 2, 24.
Conchyliology, 2.
CONCHYLIOLOGIE Nouvelle, 56.

Conchylium. See Operculum.

Conus, 193.

——— See Volute.

Corals, 128, 149.

——— See Eſcallop.

Cornua Ammonis. See Ammonia.

Corpus. See Body.

Cowries. See *Cyprea.*

Cover. See Operculum.

Crane, 214.

Creeping Stones. See Operculum.

Crozier. See *Lituus.*

Cruſtacea defined, 2.

Cuneus, 270.

——— foſſil, 271.

Cylindri, or *Cylindars.* See *Olives.*

Cymbium, 68, 125, 127, 169.

Cyprea, 70, 76, 110, 112, 173, 177, 182.

D.

Dactyli. See Prongs,

DAVILA, 55, 99, 237.

Declivitas. See Slopes.

Dentale, 127, 152.

Devil, 225.

Devil's Claws, 230.
Digiti. See Prongs.
Dippers, or *Dipping Suails.* See *Bulla.*
Dolphin, 201.
Ducal Mantle. See Eſcallop.
Duck's Foot. See Eſcallop.

E.

Ear-Shells. See Auris Cochlea and Haliotis.
Echini not teſtacea, 129.
Egg poached, 177.
—— *Pewit's.* See Bulla.
Epidermis, 72, 110, 134.
Eſcallops, 244.
——— *Ducal Mantle*, 245.
——— *Compaſs* or *Sole*, 245.
——— *Duck's Foot* or *Coral*, 245.
——— foſſil, 247.

F.

Fent of a Bivalve, 243.
Fig. 194.
Figures in Natural Hiſtory neceſſary, 52.
Flats of a Bivalve, 243.

Flamboyants, 192.
Fleabite, 192.
Furrow of a Bivalve, 242.

G.

Gapers. See Bivalves and Chama.
Garnet. See Limpet.
GESNER, 57.
GEVE, 43.
Glaſs Oyſter. See Placenta.
Globoſa, 193.
Goat's Eye. See Limpet.
GREW, 57, 83, 235.
Grimace, 213.
Gryphitæ. See Oyſters foſſil.
GUALTIERI, 31, 42, 88, 236.

H.

Haliotis, 77, 144.
HAMEL du, 62.
Hams. See Pinna.
Hammer Oyſter. See Oyſter.
HARDER, 6.
Harp, 194.
Head of an Univalve, 112.

Hearts. See Cockles.

HEBENSTREIT, 57.

Helix. See Shells, Turban, Cochlea.

Helmets. See Caſſides.

Heteroſtrophon. See Shells.

HEYDE, 6.

Hiantes. See Bivalves that never cloſe.

Hinge of Bivalves, 133, 233, 241.

———— articulate, 242.

———— multarticulate, 242.

———— inarticulate, 242.

Hippocephaloides, foſſil, 266.

HUDDESFORD. See Liſter.

I.

IMPERATUS, 57.

Imperial Crown, 192.

Inæquilateræ. See Margins.

Inſtructions for collecting, &c. Shells. See Shells.

Joppa Whelk, 215.

K.

KIRCHER, 38.

KLEIN, 42.

KNORR, 46.

L.

Labium. See Lip.
Lamps. See Cochlea Helix.
LANGIUS, 54, 85.
Latus Complanatum. See Flat.
Lepas. See Limpet.
Leptopolyginglymi. See Bivalves multarticulate.
Libot. See Limpet.
Lid. See Operculum.
Limax. See Snail.
Limpet, 69, 77, 93, 97, 136.
——— whole, 138.
——— chambered, 138, 140.
——— maſks, 138, 140.
——— foſſil, 142.
——— common. 140.
——— Libot or black, 13, 20.
——— Thorny, 15.
——— Beauty, 15.
——— Aſtrolepas, 15.
——— Goat's Eye, 22, 140.
——— Garnet, 22.
——— blue-rayed, 22, 125.
——— tortoiſe, 105.
——— cracked, or notched, 125.

Limpet, Concho Lepas, 139.
——— Cochlea Lepas, 139.
LINNEUS, 55, 94, 97, 108, 237.
Lip of a turbinated Shell, 116.
LISTER, 5, 25, 80, 234.
Lituus, 154, 159.

M.

Magpye, 200.
MAJOR, 52.
Margaritiferæ, 272.
Margines, or *Margins of a Bivalve*, 240.
MARTINI, 49, 100.
Maſks. See Limpets.
Melons, 194.
MEUSCHEN, 56, 100, 238.
Midas Ear, 204.
Monothalamia. See Shells ſimple.
MOSCARDO, 57.
Mouth. See Aperture.
Multivalves, 132, 133, 231.
Murex, 22, 224, 225.
Muſcles, 6, 70, 272, 273.

N.

Nautilus, 5, 77, 162.
——— Paper. See Cymbium.
——— Vacuus. See Cymbium.
——— Græcorum, 169.
——— foſſil, 172.
Needles. See Buccina.
Nerit, 137.
——— Bloody Tooth, 22.
——— foſſil, 200.
Nipple Shells. See Limpets.
Nuts, or *Nux*. See Bulla.

O.

Olea. See Olives.
Olives, 70, 110, 137, 189.
——— *Camp*, or *Panama*, 189.
Onyx. See Volute.
Operculum, 119.
——— of Land Shells, 121.
Orthoceratites, 154, 156, 162.
Oſcabiorns, 280.
Oſtreum. See *Oyſter.*

Oyſter, 4, 244, 249.
——— Cockſcomb, 250.
——— Chineſe, or Glaſs. See Placenta.
——— Hammer, 250.
——— Pearl. See Margaritiferæ.
——— Thorny. See Spondyle.
——— foſſil, 250.

P.

Panama. See Olive.
Papal Crown. See Tiara.
Partridge, 125, 194.
Patella. See Limpet.
Pearl, 59.
Pecten. See *Eſcallop*.
Pectinoides, 263.
——— foſſil, 263.
Pectunculi. See Cockles.
Penecilli. See *Vermiculus*.
Perioſteum. See Epidermis.
Perſian Crown, 194.
PETIVER, 38, 57.
Pewit's Egg. See *Bulla*.
PHILOSOPHICAL TRANSACTIONS, 61.
Pholas, 5, 278.

Piddocks. See *Pholas.*

Pillar, 115.

Pinna, 62, 68, 274, 277.

Placenta, 271.

PLANCUS, 39.

Planities. See Flat.

Planorbis, 201.

PLINY, 57.

Poached Egg, 177.

Poliſh Saddle, 271.

Polythalamia. See Shells chambered.

Porcellana. See *Cyprea.*

Poſthorns. See Helix Cochlea.

Prongs, 117.

Purple Dye, Tyrian, 59, 222.

——— Engliſh, 61.

——— French, 62.

Purple-tip. See Volute.

Purpura, 5; and ſee Buccina.

——— bilinguia. See Buccina.

——— how they bore holes in Shells, 220.

Purrs. See Chama.

R.

Ram's-horn. See *Lituus.*
Razor-Shells. See *Solen.*
REAUMUR, 5.
REGENFUS, 49.
Revolved. See Shells.
Rhombi, 225, 226.
——— Cylindracei. See Olives.
——— Cylindro pyramidales. See Volutes.
——— foſſil, 229.
Rima. See *Fent.*
Rocks and *Rochers.* See Murex.
RONDELETIUS, 57.
Roſtrum. See Beak.
ROUSSET, 6.
RUMPHIUS, 37, 84, 238.

S.

Sabella, 149.
Scoop, 117, 229.
Screws. Soe Strombi.
Sea Ears. See *Haliotis.*
——— *Wings.* See *Pinna.*

Sea Nuts. See *Bulla.*

——— *Silk-Worms.* See Pinna.

SEBA, 47, 92, 238.

SELLIUS, 6.

Semiporcellana, 173, 176.

Sheaths. See Solen.

Shells, definition of, 2, 3.

——— fiſh, of them, 3, 4, 5, 6.

——— whether the Syſtems of them ſhould be formed from the Animals or the Shells, 6.

——— Syſtems of, 79.

——— Syſtem of the Author, 101, 132, 135; & the Tabulæ Synopticæ.

——— Uſe of, 58.

——— Inſtructions for collecting, cleaning, &c. 64, 68, 103.

——— Characters of, 102.

——— dead, 67.

——— Land, 4, 67, 121, 124, 125.

——— Freſh Water, 4, 67, 68, 124.

——— Sea, 4, 124.

——— ſimple, 123, 133, 136.

——— turbinated, 123, 180.

——— chambered, 123, 133, 154.

——— revolved, 118, 123, 133, 173.

——— tubular, 148.

——— Monothalamia. See Turbinated and Simple.

Shells, Polythalamia. See Chambered.
——— Helices, 118.
——— Heteroſtropha, 119.
——— Operculated, 119.
——— Umbilicated, 117.
——— See Bivalves, Univalves, and Multivalves.
——— thoſe moſt common in the recent or living ſtate occur ſeldom foſſil, and vice verſa, 163, 260.
Ship Worms. See *Teredo.*
Sinus. See *Scoop.*
SLOANE, 57.
Slopes of a bivalve, 242.
Snails, 17, 70, 77. And ſee *Cochlea.*
—— Gold Mouth, 204.
—— Silver Mouth, 204,
—— Serpents ſkin, 204.
—— Ear. See Auris Cochlea.
—— Land, 4, 5.
Sole. See Eſcallop.
Solen, 5, 274, 276.
Spiders, 22, 230.
Spire, or Spira, 113. See Whirl.
Spondyle, 244, 249.
Strombi. See Buccina.
Sulcus. See *Furrow.*
Summit of a Bivalve, 240.
Surface of a Bivalve, Superficies, 240.
Swallow, 272.
SWAMMERDAM, 6.

T.

Tellen & Tellina, 70, 269, 270.
Terebratula. See Anomia.
Teredo, 5, 6.
Teſtacea. See Shells.
Thorny Oyſter. See Spondyle.
Tiara, 216.
Tongue, 116.
Tops. See Trochi.
TOURNEFORT, 42, 90, 237.
Trichites, 142.
Tridacna, 274.
Trochi, 77, 197.
—— Foſſil, 197.
Tuns. See *Globoſæ*.
Turban, 115.
Turbinated. See Shells.
Turbo, 199, 203.
—— concameratus, 154, 160, 162.
Turn. See Whirl.
Tyger. See *Volutes*.

U.

Umbo. See Beak.
Unguis. See Operculum.

Unguli. See Claws.

Univalves, 132, 133, 136.

——— moſt numerous and moſt beautiful Shells, 231.

V.

Valentyn, 44.

Venus Ear. See Auris Cochlea.

Vermes & Vermiculi, 127, 128, 148.

——— chambered, 148, 151.

——— penecilli, 148, 150.

Vincent, 57.

Vis. See Strombus.

Volutes, 22, 70, 98, 137.

——— *Admirals*, 16.

——— *Brocades*, 16.

——— *Onyx*, or Purple Tip, 16, 76.

——— *Tygers*, 16.

Volſella. See Pectinoides.

W.

Walenbroch, 56.

Watering Pot. See Penecillus.

Weavers Shuttle, 177.

Wentletrap, 151, 204.

Whelk. See Buccina.

Whirl, 113.

Woodcock Thorny, 215.
Woodward, 238.
Wormius, 57.
Worms. See Vermes.
—— Sea Silk. See Pinna.
—— Ship. See Teredo.
Wreaths. See Whirl.

X.

Xylophagus. See Teredo.

* * *

Catalogue